

THE UNIVERSITY OF TEXAS AT AUSTIN

RECOMMENDATION FOR CHANGE IN ACADEMIC RANK/STATUS

Name: Okuno, Ryosuke EID: ro859 Present Rank: Assistant Professor

Years of Academic Service (Include AY 2017-18 in each count):

At UT Austin since: 9/1/2015 (month/day/year) Total Years at UT Austin: 3In Present Rank since: 9/1/2015 (month/day/year) Total Years in Present Rank: 3

Tenure-track only:

Number of Years in Probationary Status: 3Additional information: AcceleratedPrimary Department: Petroleum and Geosystems EngineeringCollege/School: Engineering, Cockrell School ofJoint Department: N/ACollege/School: N/AOther Department(s): N/ARecommendation actions¹:By Budget Council/Executive Committee: PromoteVote² for promotion 8; Against 1; Abstain 1; Absent 0; Ineligible to vote 1By Department Chair: PromoteBy College/School Advisory Committee: PromoteVote² for promotion 7; Against 0; Abstain 0; Absent 0; Ineligible to vote 0By Dean: PromoteAdministrative Action: Promote to Associate ProfessorDate Action Effective: September 1, 2018

(To be submitted to the Board of Regents as part of the annual budget.)

By: Mauri M. Smith

For the President

Date: February 15, 2018¹ See "Chart of Recommended Actions" for eligible recommended actions applicable to specific conditions and administrative levels.² Record all votes for and against promotion, abstentions by eligible voting members, and the number of absent eligible voting members. The number of committee members ineligible to vote should also be recorded. Enter zero where it would otherwise be blank.

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The University of Texas at Austin

Cockrell School of Engineering**Dean's Assessment****Ryosuke Okuno**Hildebrand Department of Petroleum and Geosystems Engineering
Cockrell School of Engineering

Dr. Ryosuke Okuno received his BE and his ME in geosystems engineering from the University of Tokyo (Japan) in 1998 and 2000, respectively. After completing his MS, he worked for five years at Japan Petroleum Exploration Co. (JAPEX). He received his PhD in Petroleum and Geosystems Engineering from the University of Texas at Austin in 2009¹. After completing his Ph.D., he returned to JAPEX for one year before joining the faculty at the University of Alberta (Canada) as an assistant professor in the School of Mining and Petroleum Engineering in September 2010. Dr. Okuno joined the faculty in the Hildebrand Department of Petroleum and Geosystems Engineering (PGE) at the University of Texas at Austin in September 2015.

If promoted to associate professor in September 2018, Dr. Okuno will have accumulated three years of probationary service at UT and a total of eight years in rank as an assistant professor. While this case is considered to be accelerated when considering only Dr. Okuno's time at UT, his total time in rank exceeds our normal timeline.

Dr. Okuno's research focuses on developing methods to improve oil recovery in conventional and unconventional reservoir systems. He develops computational models based on thermodynamics and interfacial mass transfer to represent the multiphase behavior of petroleum fluids in porous media and he conducts experiments to understand complex fluid systems under high-temperature and high-pressure conditions. Within the Hildebrand Department of Petroleum and Geosystems Engineering, his work contributes to six of the twelve primary research areas: geologic carbon storage; enhanced oil recovery; reservoir engineering; unconventional resources; petrophysics and pore scale processes; and reservoir simulation.

Eight external letters were submitted as part of the promotion dossier, with two letter writers recommended by Dr. Okuno and six selected by the budget council. All letter writers are faculty at US institutions: Penn State², Pittsburgh, Rice, Stanford, Texas A&M, University of Southern California (USC) and Utah. Two of the letter writers are members of the National Academy of Engineering (NAE).

Letters were solicited from seven additional external reviewers. Three declined due to personal commitments and/or lack of familiarity with Dr. Okuno's area of research. Four potential international reviewers did not respond to the request.

¹ Russell T. Johns (now chair of the Petroleum and Natural Gas Engineering Program at Penn State) and Kamy Sepehrnoori co-supervised Dr. Okuno during his graduate studies at UT.

² Sanjay Srinivasan (now head of the Department of Energy and Mineral Engineering at Penn State) was on the faculty in PGE while Dr. Okuno was a graduate student. However, Dr. Okuno did not take a course from Dr. Srinivasan and Dr. Srinivasan was not a member of his doctoral committee.

Teaching

While in rank at UT, Dr. Okuno has taught one undergraduate course and one graduate course:

- PGE 427, *Properties of Petroleum Fluids*
Required undergraduate course
Taught two times (average enrollment of 30 students)
Instructor ratings: 4.4 | Course ratings: 3.8 to 4.2
- PGE 384, *Advanced Thermodynamics and Phase Behavior*
Graduate elective
Taught two times (average enrollment of 18 students)
Instructor ratings: 3.8 to 3.9 | Course ratings: 3.7 to 4.0

Dr. Okuno's instructor ratings at the undergraduate level are above the median (4.3) for both the department and the Cockrell School. However, his instructor ratings at the graduate level are considerably below the median within the department (4.3), and correspond to the lowest 15% of graduate courses taught by tenured and tenure-track faculty within the school. Review of the student comments indicates that the low ratings are likely related to the workload. One student commented, "This was the heaviest workload I have experienced to date (3 years here)... I don't know how anyone can keep up."

Gary Pope conducted peer evaluations during two of Dr. Okuno's lectures in PGE 384 during the 2016 spring semester. He noted, "*Thermodynamics and Phase Behavior* is one of the most abstract and difficult subjects we teach in Petroleum Engineering," but he did not provide any suggestions for improving the course.

CIS data from PGE 384 between spring 2007 and spring 2017 are summarized below. Dr. Okuno's ratings are slightly below the historical averages (4.0 instructor | 4.0 course), but appear to be reasonable given the course content.

Spring	Instructor	Instructor Rating	Course Rating
2007	Gary Pope	3.1	3.4
2008	Russell Johns	4.4	4.4
2009	David DiCarlo	3.9	3.9
2010	Russell Johns	4.1	3.8
2011	David DiCarlo	4.0	4.0
2012	David DiCarlo	4.3	3.9
2013	Gary Pope	4.2	4.0
2014	David DiCarlo	4.1	4.1
2015	David DiCarlo	4.7	4.3
2016	Ryosuke Okuno	3.8	4.0
2017	Ryosuke Okuno	3.9	3.7

Dr. Okuno taught fourteen classes (four distinct courses) as a faculty member at Alberta. His average instructor rating was 4.0 (on a 5-pt scale) in both undergraduate and graduate courses.

Research

Dr. Okuno's research focus is related to the thermodynamic characterization of petroleum reservoir fluids used in enhanced oil recovery. Specifically, he characterizes phase behavior of solvent, oil, and water mixtures and develops computationally robust algorithms for simulating these phase properties. While his research was initially a mix of theoretical and computational work, he has recently developed unique experimental capabilities that complement his theoretical and computational activities. Highlights of Dr. Okuno's research accomplishments include:

- 22 archival journal publications in rank³ (24 career total). He published 19 journal papers in rank with his graduate students.
- Many of his publications are in top journals in his field including *Fuel* (IF=4.6), *Industrial and Engineering Chemistry Research* (2.8), *Fluid Phase Equilibria* (2.5), and *SPE⁴ Journal* (2.2).
- Filed 1 US patent application in rank.
- An h-index of 11 (Google Scholar) with 423 citations.

Since joining UT, Dr. Okuno has received four external research grants totaling \$440,000. He is the sole PI on grants from Japan Petroleum Exploration, Japan Canada Oil Sands, and two joint industry projects that senior faculty in the department direct⁵. Three additional grants/contracts are in the final stages of negotiations. Dr. Okuno is the PI on all three, and Larry Lake is the co-PI on two. The total research funding pending is \$290,000 (\$270,000 his share).

While at Alberta, Dr. Okuno was the sole PI on five external research grants. He received funding from the Natural Science and Engineering Research Council of Canada (equivalent to NSF in the US), the Canada Foundation for Innovation, Japan Petroleum Exploration, and the Society of Petroleum Engineers. Total funding exceeded \$600,000 (CAD).

Two of the external reviewers gave lukewarm assessments of Dr. Okuno's record of external funding:

- Walter Chapman⁶ (Rice) stated, "His research funding level appears good although he has had to essentially start over after moving from the University of Alberta."
- Milind Deo⁷ (Utah) indicated, "His funding record is reasonably good... It would have been good to see support from the Department of Energy ... or the National Science Foundation."

Dr. Chapman also wrote, "Dr. Okuno's production of published manuscripts is reasonable for a faculty member at this stage of his career." However, the department chair provided a comprehensive analysis to indicate that Dr. Okuno's publication record exceeds the norms in the field.

All the external reviewers indicated that Dr. Okuno's work was of high quality and recommended promotion.

³ Ten at UT (one is in press) and twelve at Alberta.

⁴ *Society of Petroleum Engineering*

⁵ Kishore Mohanty and Gary Pope direct these joint industry projects.

⁶ Department of Chemical and Biomolecular Engineering

⁷ Department of Chemical Engineering

Advising and Student Mentoring

At Alberta, Dr. Okuno graduated two PhD and seven MS students (two MS students were co-supervised). Dr. Chapman also expressed concerns that Dr. Okuno worked primarily with MS students at Alberta.

Dr. Okuno has not graduated any graduate students at UT, but a PhD student is scheduled to complete her degree this fall. Dr. Okuno is currently advising six PhD and one MS students. He has also mentored three postdoctoral fellows at UT.

University Service

Dr. Okuno's university service has been focused at the department level at UT, where he has served on a faculty recruiting committee and the graduate admissions committee.

Professional Service

Dr. Okuno is a member of several professional organizations and is an associate editor for the *SPE Journal*. He also served for three years as an associate editor for the *Journal of Natural Gas Science and Engineering* (Elsevier).

Other Evidence of Merit or Recognition

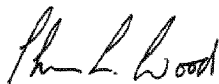
Dr. Okuno received one of six Research Fellowship Awards from the Society of Petroleum Engineers in 2012. The award provides seed funding to new faculty members and recognizes their creative research ideas.

Overall Assessment

In summary, Dr. Okuno is a solid teacher and an outstanding researcher. He is developing important computational models for enhanced oil recovery and he has reestablished his independent research program since moving to UT two years ago. He has been successful in securing research funding from industrial sources, and he has published in the top journals in his field. External referees enthusiastically support his promotion. His record of student advising and mentoring is strong, and his level of service to the university and his professional community is appropriate.

As noted, two external reviewers questioned the sustainability of Dr. Okuno's research funding, but I am not concerned. Many of the faculty in the Hildebrand Department of Petroleum and Geosystems Engineering receive the majority of their research funding from industry. Dr. Okuno has clearly demonstrated an ability to secure industrial funding, despite the global downturn in the oil and gas industry. He also was successful in securing federal funding in Canada.

Overall, I believe that Dr. Okuno's performance meets or exceeds expectations for early promotion to associate professor with tenure in all categories, and I support this case without reservation.



Sharon L. Wood, Dean
18 November 2017

Chair's Statement

Ryosuke Okuno, Petroleum and Geosystems Engineering Promotion from Assistant to Associate Professor with Tenure

Summary Statement

I fully support the Budget Council's decision to promote Dr. Ryosuke Okuno from Assistant Professor to Associate Professor with tenure. He has met or exceeded expectations in teaching, research and service to the Department of Petroleum and Geosystems Engineering (PGE), to the Cockrell School of Engineering, to The University of Texas at Austin, and to the broader scientific and professional community.

Dr. Okuno earned a BE (1998) and ME (2000) in Geosystems Engineering from the University of Tokyo. He then worked 5 years as a petroleum engineer for Japan Petroleum Exploration Company (JAPEX). In 2006, he started his graduate work at UT Austin, and graduated with his PhD from UT PGE in August 2009. He spent another year working for JAPEX before joining the University of Alberta faculty, where he served from 2010 to 2015. He joined the UT PGE faculty in the fall of 2015. In August 2017, he completed his 7th year in rank as an assistant professor, which was his 2nd year at UT. It is Dr. Okuno's wish to go up for tenure at this time, and the department supports that timing.

Budget Council Discussion and Decision

The promotion process started with the solicitation in June of external letters. The candidate submitted his statements and supporting materials over the summer, and these were made available for Budget Council review the week prior to our September 5, 2017 meeting, along with the external referee letters and Budget Council statements. The Budget Council statements were prepared by the PGE Promotion and Tenure Committee, consisting of Dr. Kamy Sepehrnoori (chair), Dr. Mukul Sharma and Dr. Eric van Oort. Dr. Gary Pope and Dr. Larry Lake were ad hoc members of the committee recruited to help prepare the teaching, advising, honors and service statements.

The entire Budget Council attended the September 5 meeting, except for our newest member, Dr. Quoc Nguyen. Dr. Nguyen was promoted to full professor effective September 1, 2017, and had not participated in the Budget Council process in the spring and summer leading up to the promotion vote. As such, in discussions with me prior to the meeting, he expressed the feeling that he was not well-informed on the background of the candidates or the process, and he chose to abstain from voting. Our past history of promotion votes was to have the Budget Council meet before the beginning of the new academic year, and that had been our intention this year, so we had not been keeping Dr. Nguyen in the loop of our work. However, due to scheduling constraints and the late reception of outside reference letters that delayed our Budget Council statement completion, the process bled into September 2017. Including Dr. Nguyen's abstention, the final vote of the Budget Council for promotion of Dr. Okuno was 8 in favor, 1 opposed and 1 abstained.

The Budget Council discussion concerning Dr. Okuno was very complimentary of his teaching and research accomplishments. He was commended for his large number of publications in excellent

journals. One of the National Academy of Engineering (NAE) members of the Budget Council commented that he thought Okuno's work was of the highest quality and was having significant impact, surpassing this BC member's own early achievements. Okuno was compared favorably with the Faculty Investment Initiative candidate who we are currently trying to hire from industry and who was recently named an NAE member. His industry experience was noted as a significant advantage for both teaching and research. His research funding since arriving at UT was considered modest but many commented that challenges in money were understandable given the current economic climate of the oil industry. Another comment made was that Okuno's two National Science and Engineering Research Council of Canada (NSERC) grants, won when at University of Alberta, were the equivalent of receiving a prestigious NSF award in the United States, and that this should be emphasized as significant when considering his merit and recognition accomplishments.

One final point of discussion was the topic of "hiring our own". There was one faculty member who voiced this concern, stating discomfort with any department hiring its own PhD students onto the faculty, but there was no specific criticism of Dr. Okuno in the comment. Responses from other Budget Council members asserted the fact that Okuno had succeeded in separating himself from his advisor (Dr. Russell Johns, now at Penn State University). Okuno had also been gone for 6 years and made his own way. We hired him back because of his success after he left Austin. One final comment with regard to hiring our own PhD's was that given the fact that we are the number 1 ranked program in petroleum engineering in the country, and that our true peers are only Stanford and possibly A&M, the pool of petroleum engineering trained candidates for hiring is very limited. We do also hire candidates with related degrees, such as quantitative geoscience and chemical engineering, but we have a strong desire to hire petroleum engineers, and our PhD graduates make for a very appealing candidate pool. Our current mix of faculty origin is 4 UT PGE PhD's out of 20 tenured or tenure-track, with 2 of those UT degreed being full professors over the age of 60. The Budget Council is comfortable that we do not have a problem with in-breeding and will not have the problem any time soon, as am I.

Chair's Analysis of Teaching

The typical teaching load for an assistant professor in PGE is 3 courses per year. New hires typically get some teaching relief, teaching only one course per semester (2 per year) for a year or two. Dr. Okuno was offered two years of reduced teaching (1 and 1) at the time of hiring, and that is what he has taught.

One of the many reasons Dr. Okuno was attractive to hire into UT PGE was his broad experience in petroleum engineering from both an industrial and academic perspective. The fact that he is traditionally trained as a petroleum engineer means he can teach a broad range of our courses, which is highly valuable to the department as we have several senior faculty that are reaching retirement age. On the undergraduate side, Dr. Okuno currently teaches the PGE 427 Petroleum Fluids course, but he could easily move to any of our three reservoir engineering courses (PGE 323K, L and M), our PGE 362 Production Engineering course, PGE 322K Transport Phenomena, PGE 326 Thermodynamics and Phase Behavior, and the PGE 301 Introduction to Petroleum Engineering course. His industrial experience means he can bring real world relevance to his instruction, which is highly desired at the undergraduate

level. At the graduate level, he has taught our PGE 384 Advanced Thermodynamics course, but again he could easily step into our PGE 388 Advanced Reservoir Engineering course, any of our multiple graduate enhanced oil recovery (EOR) courses, and PGE 383 Advanced Production Engineering.

Dr. Okuno's undergraduate CIS ratings are 4.4 for the instructor and 4.0 for the course, which are above and at average, respectively, when compared to department and college ratings (4.2 for instructor and 3.9-4.0 for course). Comments on his CIS forms were uniformly positive and included praise for his explanatory capability and his care for student well-being. At the graduate level, his ratings have been slightly below average with a 3.85 average rating for both instructor and course. Reading the course comments from students for the graduate course, the primary difficulty the students expressed with Dr. Okuno was that the course workload was heavy and the material was very challenging. There were several comments praising Dr. Okuno's ability to lecture and explain concepts, but the pace and complexity was a challenge. In the first offering of the course, there were also comments that the TA was not very good. It appears that Dr. Okuno is much more demanding of his students at the graduate level. Whether those expectations are unreasonable is hard to judge, but when teaching at the forefront of technology, it is to be expected that some students may not be able to keep up. I would also expect his ability to judge the pacing and magnitude of workload will improve with time. I believe these are adjustments that can be made with the help of mentorship as he progresses in his career.

Given the CIS ratings, student comments and the peer evaluations of Dr. Okuno's teaching, my assessment is that he meets or exceeds expectations.

Chair's Analysis of Research

In my assessment of Dr. Okuno's research achievements, I will include excerpts from his external referees. Dr. Okuno received 8 external letters, 6 of which were writers chosen by the PGE Budget Council and 2 were suggested by him. The respondents include NAE members, faculty from the best petroleum related programs in the world (Stanford University, Rice, USC and Texas A&M), department chairs, and faculty from other peer engineering programs (Penn State, University of Pittsburgh and University of Utah). Three potential referees declined because of lack of time (Abedi, University of Calgary; Datta-Gupta, NAE, Texas A&M; Stenby, Technical University of Denmark). Four international referees never responded (Skauge and Graue, University of Bergen; Nghiem, University of Calgary) or stopped responding (Peng, University of Saskatchewan). I do not consider any of these seven declinations or non-responses to indicate a negative view of Dr. Okuno's accomplishments. The large number of non-respondents is partly a reflection of the fact that it is getting harder to find willing referees (not sure of the reason), plus there was some poor judgement on my part on timing of requests. We have had difficulty with European referees in the past when the request falls in the summer months, particularly July and August. This was the case this time. Also, Datta-Gupta of A&M has declined us in the past – we should have known he would do it again this time. However, we were really wanting an A&M person with relevant experience and his NAE made him attractive. We had already asked one A&M person for our other candidate going up this summer – our choices were limited in finding another so we took the risk.

Dr. Okuno published 22 journal papers over the past 7 years while in rank as an assistant professor, and most of those papers (21) were co-authored with students. This number of 22 papers in rank as an assistant professor is at the top of the range of the last five PGE faculty promoted to associate professor with tenure (see Table 1). This demonstrates that Dr. Okuno should be considered highly productive in research publication when compared to others in UT PGE at a similar point in their career.

Table 1. Publications numbers when going up for promotion to associate professor					
	In-Rank	Total	Date Promoted	Date PhD granted	Years since PhD at promotion
Okuno	22	26	---	2010	7
Prodanovic	22	31	2016	2005	11
Foster	19	22	2017	2009	6
DiCarlo	17	63	2013	1994	19
Nguyen	13	16	2011	2003	8
Balhoff	9	13	2013	2005	8

Based on the most recent data provided by the Association of US Petroleum Engineering Department Heads, the average publication rate of journal papers for petroleum engineering faculty of all ranks is two to three per year. Okuno's 7 year average is 3 journal publications per year, but since 2014 he has averaged 5 journal papers per year, which is clearly above the national average.

In petroleum engineering, conference papers are also an important medium for reporting research results. For conferences of the Society of Petroleum Engineers (SPE), which is where most of Okuno's papers are presented, the acceptance rate is based on abstracts and is very competitive. Acceptance rate is less than 25% for most SPE conferences. After abstract acceptance, full papers must be written and submitted prior to the conference (there is a no paper, no podium policy). Figure 1 shows that Dr. Okuno has been at the average conference papers published per year as compared to other assistant professors in PGE. This is a very respectable level of activity for an assistant professor, and above national averages for petroleum engineering faculty for conference papers, which is between 3 and 5 conference papers per year according to the Association of US Petroleum Engineering Department Heads. His 6 journal and 5 conference papers published thus far in 2017 are average to better than average in the pool of high performing PGE faculty, and are better than national averages.

Comments from the external reviewers that touch on productivity include Walter Chapman (Rice University), who affirms Okuno's research productivity and quality, saying "*Dr. Okuno's production of published manuscripts is reasonable for a faculty member at this stage of his career. ... Dr. Okuno's publications are in quality journals and the research is of high quality.*"

With regard to journals, Dr. Okuno has placed papers in many of the top titles for our field, including **SPE Journal**, **Fluid Phase Equilibria**, and **SPE Reservoir Evaluation & Engineering Journal**. Dr. Sanjay Srinivasan (Penn State University) assesses Okuno's publications in this way – "*The number of*

publications that he has in rank and the quality of those publications would certainly place him in the upper echelon of faculty cases being considered for tenure at my current institution."

Hamdi Tchelepi (Stanford University) gave some focused feedback on Okuno's achievements in published works and his potential to contribute in the future - *"...In my opinion, [his] experimental and fluid characterization programs of solvent-hydrocarbon-water mixtures stand out without peer. That work has contributed substantially to our collective confidence in the simulation predictions of heavy-oil recovery processes. ... In his statement, Prof. Okuno indicated interest in investigating the complex phase behaviors of tight media, such as gas/oil-shale. My sense is that he should be encouraged strongly to jump in without hesitation. The field would benefit from his expertise and perspective."*

Robert Enick (Pitt) gets more explicit about the significance of the individual papers that were sent out with the promotion letter request, saying, *"Dr. Okuno is one of the few engineers who routinely tackles very difficult multi-phase problems... Because of the level of difficulty... there are few solid, meaningful, useful papers on this topic; I have found Dr. Okuno's work to be outstanding in this regard, particularly his 2010 paper... ...I have incorporated these findings into my CO2 EOR class at Pitt. ...[his] 2015 paper ...was an impressive and clever paper and will likely end up being one of his more impactful for modelers."*

John Lee (NAE, Texas A&M) gets similarly detailed in his assessment - *"...His 2016 paper... is especially noteworthy because it was published in the [SPE's] most prestigious journal... Perhaps of more general and fundamental interest is Dr. Okuno's 2015 paper published in Chemical Engineering Science... Particularly striking is the fact that the methodology was successfully applied to 84 different reservoir fluids, including gas condensates, volatile oils, black oils, and heavy oils. Remarkable!"*

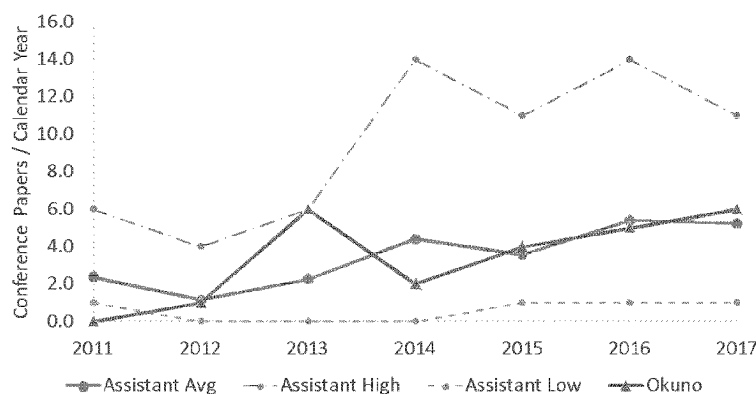


Figure 1. Conference papers published per calendar year for Dr. Okuno and other assistant professors in PGE while in rank as an assistant professor. (Okuno's data is not included in the average and range for the other assistant professors. 2017 is an incomplete year.)

Citations are a commonly applied quantitative way to measure significance and impact of published papers, but their interpretation can be difficult, particularly for young researchers. Okuno's h-index of 11 (Google Scholar) and total citations of 382 (Google Scholar) are toward the lower end of the range of

other PGE assistant professors, whose h-indices range from 10 to 14 and citations range from 330 to 906. A plot of citations versus time (Figure 2), however, shows that Okuno is competitive with the other assistant professors and those most recently promoted to associate (his trend falls in the middle of the range).

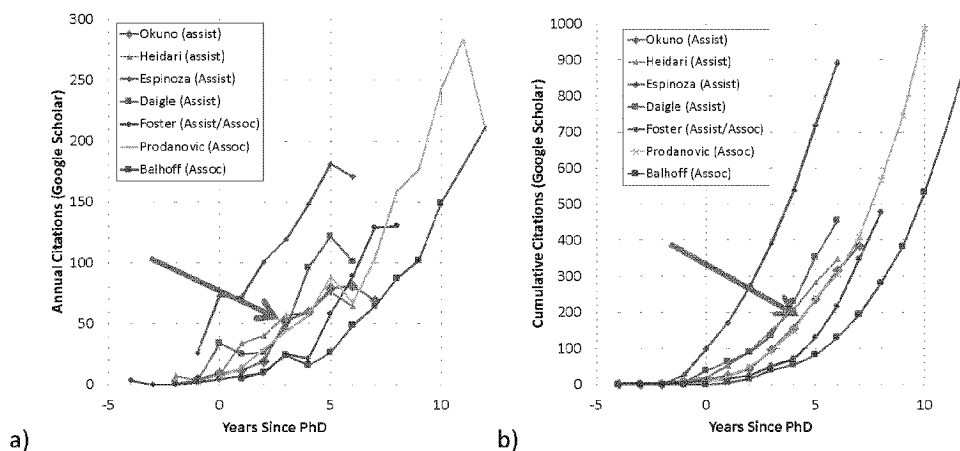


Figure 2. a) Annual and b) cumulative citation data for current and recently promoted UT-PGE assistant professors. The arrow points at Okuno's curve. Data source is Google Scholar, September 18, 2017.

The ability to compete for research funding is another measure of recognition of a researcher's accomplishments. The most notable grants secured by Dr. Okuno that point to his quality of work are the two National Science and Engineering Research Council of Canada (NSERC) grants. NSERC is considered to be equivalent to the National Science Foundation (NSF) in the United States, and thus competition for this type of funding is considerable. Dr. Okuno's success in getting two of these grants (C\$120,000 and C\$140,000) at the University of Alberta is a considerable achievement. At UT Austin, his success has been more modest but he has been able to sustain his program with a reasonable number of graduate students. The difficulty of the current funding environment is affirmed by Milind Deo (University of Utah), who writes in his letter, *"His funding record is reasonably good ... in a tough funding environment... ..opportunities at the US DOE are at historical lows and the reception for Petroleum Engineering related research at NSF has not been promising."* Walter Chapman (Rice University) adds on this topic, *"His research funding level appears good...I do not consider research funding to be a concern since, as the impact of his research continues to grow, he will find new research and funding opportunities."*

Overall, my assessment is that Dr. Okuno meets or exceeds expectations with regard to research for promotion to associate professor with tenure.

Chair's Analysis of Advising, Counseling, and Other Student Service

With regard to graduate student supervision, Dr. Okuno has graduated two PhD students (sole supervised) and six MS students (5 co-supervised) while in rank. All of these students received their

degrees from the University of Alberta, which is highly respected for their programs in petroleum related fields. Significantly, Dr. Okuno's first PhD graduate published 6 journal papers from his dissertation, and was hired as a full professor at the Indian Institute of Technology in Dhanbad. His PhD pipeline includes five UT Austin students (1 co-supervised) and one Alberta student. He has formally mentored two undergraduates at the University of Alberta and one at UT Austin. While at Alberta, Dr. Okuno served as an advisor for their SPE student chapter. I assess that Dr. Okuno meets expectations for promotion related to student advising and counseling.

Chair's Analysis of Administrative and Committee Service

As chair, I have found Dr. Okuno to be willing and responsible in his service to the department. He responsibly attends faculty meetings and committee meetings, works well with others and contributes substantively to the work. He has engaged with the faculty to build relationships with his peers. He has been a good addition to the faculty recruiting, graduate admissions and graduate curriculum committees. As evidenced by his resume, he was also a contributor to department and university service at the University of Alberta. He is an award-winning technical editor for SPE and Elsevier journals. Iraj Ershagi (NAE, USC) states in his letter, *"I am aware of ...his outstanding technical editor services to the Society of Petroleum Engineers."* As department chair, I am very happy with his activities thus far in his career with regard to service, and these accomplishments meet the expectations for promotion.

Chair's Analysis of Honors and Other Evidence of Merit or Recognition

I have already mentioned that Dr. Okuno's securing of NSERC grants is a strong indication of merit and recognition. His 2012 SPE Petroleum Engineering Junior Faculty Research Initiation Award is another indication of recognition. His overall funding in rank of C\$613,965 and US\$482,845 is slightly above average for past assistant professors rising in rank. Iraj Ershagi (NAE, USC) evaluates these facts in the following way: *"While at UT, his level of efforts in raising research funding and supervising research has been outstanding... The recognition he has received from SPE with the Junior Faculty Research Award is indicative of his originality and creative abilities."* Although it has been a very challenging time for all of us in the research support hunt since the price of oil fell by more than 50% two years ago, he has reached out to other faculty in the department and has proposed many creative ideas that are gaining traction. Looking forward, Okuno has what are essentially "verbal" commitments to funding for three projects that sum to almost \$300,000 for this coming year, but the final signatures have not yet been secured (Saudi Aramco and JX Nippon) or the check has not yet arrived (Occidental).

Overall, my assessment is that Dr. Okuno meets expectations for promotion to Associate Professor with regard to honors, merit and recognition.

Review of External Reference Letters

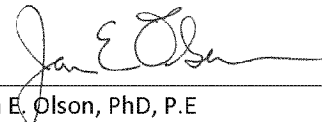
The following excerpts include additional highlights from the external reviewers, citing details in Okuno's technical work and assessing his likelihood of promotion at their universities.

- John Lee, NAE (Professor, Texas A&M University, Harold Vance Department of Petroleum Engineering) – *“...I have concluded that Dr. Okuno’s development at this stage of his career places him among the clear leaders among the younger scientists at research-intensive universities. ...He would certainly be promotable at Texas A&M. On this basis, I strongly recommend him for tenure and promotion at the University of Texas at Austin.”*
- Iraj Ershagi, NAE (USC, Mork Family Dept. of Chemical Engineering and Materials Science) – *“...I am aware of his creative contributions to the literature in the areas of phase behavior modeling His original research work at University of Alberta contributed to new understanding about recovery processes... He has been quite productive and generating great contributions to the literature... ...I am pleased to recommend his promotion...”*
- Hamdi Tchelepi (Professor, Stanford University, Energy Resources Engineering) – *“... Prof. Okuno is a world-class expert on the phase behavior associated with subsurface recovery processes. I am convinced that this area is full of great scientific and engineering challenges, and that having him in the department would yield great benefits. I would be happy to ‘compete’ with your great department in order to attract Prof. Okuno to Stanford.”*
- Walter Chapman (Rice University, Dept. of Chemical and Biochemical Engineering) – *“... Based on the quality and depth of the research, I recommend promotion to associate professor with tenure.”*
- Sanjay Srinivasan (Professor and Department Chair, Penn State University, John and Wille Leone Family Department of Energy and Mineral Engineering) – *“...I would like to conclude by stating that in my opinion, Dr. Okuno started his research career as an outstanding graduate researcher at UT Austin and has since, established himself as a leading researcher in the area of hydrocarbon thermodynamics. I see him evolving as a world-renowned scientist who combines experimental and theoretical research to solve many of the significant scientific challenges confronting humankind. I therefore strongly support his case for tenure at the University of Texas at Austin.”*
- Milind Deo (University of Utah, Chair of Department of Chemical Engineering) – *“...Dr. Okuno has an impressive publication record. He has published in diverse journals... His work on phase behavior combined with mass transfer is particularly noteworthy and will have impact in developing better enhanced oil recovery processes... Dr. Okuno has performed per expectations for a tenure-track assistant professor. ...his work is relevant and impactful in the area of phase behavior and enhanced oil recovery. ...I recommend that Dr. Okuno be granted tenure and be promoted...”*
- Robert Enick (University of Pittsburgh, Dept. of Chemical and Petroleum Engineering) – *“It is my pleasure to provide you with a very strong letter of recommendation ...for tenure and for advancement in rank... I was chair of our school’s tenure committee for six years... ...Dr. Okuno certainly merits promotion. .. He has garnered a respectable and significant amount of funding... He has developed an impressive phase behavior and transport property lab. He has established himself as an expert... He has published ... in numerous well-written and highly detailed papers...”*

- Turgay Ertekin (Penn State University, John and Willie Leon Family Dept. of Energy and Mineral Eng.) – *“...I am supporting Dr. Okuno’s promotion to associate professor and tenure enthusiastically and with no reservation. ...With his experience and expertise, Dr. Okuno is quite uniquely poised to address some of the fundamental problems of enhanced oil recovery which is a critically important topic in the success of the petroleum industry... His rather rich industrial and academic experiences, when coupled together, clearly indicate that Dr. Okuno’s work is competent and admirably collaborative and forceful towards generating new questions and answers... pushing the limits of the knowledge envelope... ...from the perspective of his research accomplishments [he] is a deserving candidate to be appointed as an associate professor as he would have been here at Penn State...”*

Concluding Statement

Reviewing the data from Dr. Okuno’s promotion packet, contemplating my experience with him over the past two years he has been on faculty at UT PGE, and taking into account the enthusiastic support given to him by his external reviewers, I whole-heartedly support his advancement to associate professor with tenure. I believe Dr. Okuno’s future potential is significant and will bring praise and recognition to the PGE department, the Cockrell School of Engineering and The University of Texas at Austin.



Jon E. Olson, PhD, P.E
Department Chair
Petroleum & Geosystems Engineering

Mid probationary Review

Mid probationary review for Dr. Ryosuke Okuno was scheduled for 2017-18.

Department of Petroleum and Geosystems Engineering

THE UNIVERSITY OF TEXAS AT AUSTIN
Cockrell School of Engineering
Standard Resume

FULL NAME: Ryosuke Okuno **TITLE:** Assistant Professor

DEPARTMENT: Petroleum and Geosystems Engineering

DATE OF BIRTH: 10/20/1974

CITIZENSHIP: Japan / Permanent Resident of United States / Permanent Resident of Canada

EDUCATION:

University of Texas at Austin	Petroleum Engineering	Ph.D.	Summer 2009
University of Tokyo, Japan	Geosystem Engineering	M.E.	Spring 2000
University of Tokyo, Japan	Geosystem Engineering	B.E.	Summer 1998

PROFESSIONAL REGISTRATION: Registered Professional Engineer in Alberta, Canada.

CURRENT AND PREVIOUS ACADEMIC POSITIONS:

University of Texas at Austin	Assistant Professor	Fall 2015-Present
University of Alberta	Adjunct Professor	Fall 2015-Present
University of Alberta	Assistant Professor	Fall 2010-Summer 2015
University of Texas at Austin	Research Assistant	Spring 2006-Summer 2009
University of Tokyo	Research Assistant	Spring 1998-Spring 2000

OTHER PROFESSIONAL EXPERIENCE:

Japan Petroleum Exploration	Reservoir Engineer	Fall 2009-Summer 2010
Japan Petroleum Exploration	Petroleum Engineer	Spring 2000-Fall 2005

CONSULTING:

Japan Canada Oil Sands, Ltd., Calgary, AB, Canada	July 2017 – July 2018
JX Nippon Oil and Gas Exploration Co., Ltd., Tokyo, Japan	May 22-24, 2017, 21 Hours
JX Nippon Oil Exploration (EOR), Ltd., Houston, TX	May 2017-Dec. 2018
Japan Canada Oil Sands, Ltd., Calgary, AB, Canada	May 2014-Aug. 2015

HONORS AND AWARDS:*In Rank*

- Technical Editor Award, SPE Reservoir Evaluation & Engineering, SPE, September 2016.

Department of Petroleum and Geosystems Engineering

- Pioneer Corporation Faculty Fellowship in Petroleum Engineering, September 2016.
- Technical Editor Award, SPE Reservoir Evaluation & Engineering, SPE, September 2015.
- Excellence in Peer Review, Journal of Natural Gas Science & Engineering, Elsevier, June 2014.
- SPE Petroleum Engineering Junior Faculty Research Initiation Award, September 2012.

Before Rank

- Scholarship from Japan Petroleum Exploration Co., Ltd. (JAPEX) and Japan Oil, Gas and Metals National Corporation (JOGMEC) for a Ph.D. degree in Petroleum Engineering at the University of Texas at Austin (2006 – 2009).

MEMBERSHIPS IN PROFESSIONAL AND HONORARY SOCIETIES:

Member, Society of Petroleum Engineers

Member, International Society for Porous Media

Member, American Society for Engineering Education

UNIVERSITY COMMITTEE ASSIGNMENTS:**Departmental***UT PGE:*

Member, Faculty Recruiting Committee	2016-present
Member, Graduate Studies Committee	2016-present
Member, PhD Qualifying Exam Committee, Math	2015-present
Member, Graduate Admissions Committee	2015-2016

UA PE:

Petroleum Engineering Graduate Coordinator	2013-2015
Member, External Affairs Committee	2010-2012

PROFESSIONAL SOCIETY AND MAJOR GOVERNMENTAL COMMITTEES:**International:**

- Evaluation Group member for Materials and Chemical Engineering, The Natural Sciences and Engineering Council of Canada (NSERC), 2017 – present.
- EOR protocol technical review committee member, Government of Alberta, Canada, 2015.
- Selection committee member for the 2015 SPE Junior Faculty Research Award.
- Examiner for National Exams for Professional Engineers Ontario, 2012 – 2014.
- Committee and Conference Session Chair, The Japanese Association for Petroleum Technology, 2009 – 2010.

COMMUNITY ACTIVITIES:*In Rank*

- Associate Editor, SPE Journal, Society of Petroleum Engineers, 2016-present.

Department of Petroleum and Geosystems Engineering

- Associate Editor, Journal of Natural Gas Science & Engineering, Elsevier, 2014-2017.
- Guest Editor, Special Issue on “Advances in Unconventional Oil and Gas Resources,” Journal of Earth Science, Springer, 2017.
- Discussion Leader for Session VII: Challenges in Reservoir Modeling and Surveillance of Unconventional Technologies in the SPE Forum on “Low Carbon Intensity Processes for Low-Mobility Oil Recovery”, Newport Beach, California, USA, July 27 – August 1, 2014.
- Moderator for SPE PetroWiki in the area of phase diagrams, 2013 – present.
- Reviewer for technical journals and societies:
 - Advances in Water Resources
 - AIChE Journal
 - American Chemical Society, Petroleum Research Fund
 - ASME Journal of Energy Resources Technology
 - ASME Journal of Fluids Engineering
 - Chemical Engineering & Technology
 - Chemical Engineering Research and Design
 - Chemical Engineering Science
 - Computational Geosciences
 - Energy & Fuels
 - Fluid Phase Equilibria
 - Fuel
 - Industrial & Engineering Chemistry Research
 - International Journal of Oil, Gas and Coal Technology
 - Journal of Petroleum Science & Engineering
 - SPE Journal
 - SPE Production & Operations Journal
 - SPE Reservoir Evaluation & Engineering Journal
 - Journal of Canadian Petroleum Technology (- 2015)
 - Journal of Marine and Petroleum Geology
 - Journal of Microencapsulation
 - Journal of Natural Gas Science & Engineering
 - Journal of Porous Media
 - Journal of the Japan Petroleum Institute
 - Journal of the Taiwan Institute of Chemical Engineers
 - Natural Sciences and Engineering Research Council of Canada (NSERC), Discovery Grants Program, and Collaborative Research and Development Grants
 - The Canadian Journal of Chemical Engineering
- Outreach:
 - Faculty advisor for Elk Island PetroChallenge Student Event, December 18-19, 2012, Sherwood Park, Alberta, Canada.

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- Faculty advisor, Engineering Expo, September 22, 2012, University of Alberta, Canada.
- Coordinated the 1st Year Student Information Evening, March 12, 2012, University of Alberta, Canada.
- Faculty advisor, Engineering Expo, September 24, 2011, University of Alberta, Canada.
- Coordinated the 1st Year Student Information Evening, March 16, 2011, University of Alberta, Canada.

PUBLICATIONS:

Note: students' names are in bold text.

A. Refereed Archival Journal Publications: (24 published; 2 accepted; 6 under review)**Published***Before Rank*

1. Okuno, R., Johns, R.T., and Sepehrnoori, K., Application of a Reduced Method in Compositional Simulation, SPE Journal, Volume 15, Number 1, pp. 39-49, March 2010. <http://dx.doi.org/10.2118/119657-PA>
2. Okuno, R., Johns, R.T., and Sepehrnoori, K., A New Algorithm for Rachford-Rice for Multiphase Compositional Simulation, SPE Journal, Volume 15, Number 2, pp. 313-325, June 2010. <http://dx.doi.org/10.2118/117752-PA>
3. Okuno, R., Johns, R.T., and Sepehrnoori, K., Three-Phase Flash in Compositional Simulation Using a Reduced Method, SPE Journal, Volume 15, Number 3, pp. 689-703, September 2010. <http://dx.doi.org/10.2118/125226-PA>
4. Okuno, R., Johns, R.T., and Sepehrnoori, K., Mechanisms for High Displacement Efficiency of Low-Temperature CO₂ Floods, SPE Journal, Volume 16, Number 4, pp. 751-767, December 2011. <http://dx.doi.org/10.2118/129846-PA>

In Rank

5. **Kumar, A.** and Okuno, R., Critical Parameters Optimized for Accurate Phase Behavior Modeling for Heavy n-Alkanes up to C100 using the Peng-Robinson Equation of State, Fluid Phase Equilibria, Volume 335, pp. 46-59, December 15, 2012. <http://dx.doi.org/10.1016/j.fluid.2012.07.029>
6. **Kumar, A.** and Okuno, R., Characterization of Reservoir Fluids using an EOS Based on Perturbation from n-Alkanes, Fluid Phase Equilibria, Volume 358, pp. 250-271, November 25, 2013. <http://dx.doi.org/10.1016/j.fluid.2013.08.035>
7. **Kumar, A.** and Okuno, R., Reservoir Oil Characterization for Compositional Simulation of Solvent Injection Processes, Industrial & Engineering Chemistry Research, Volume 53, Number 1, pp. 440-455, 2014. <http://dx.doi.org/10.1021/ie402198z>
8. **Keshavarz, M.**, Okuno, R., and Babadagli, T., Efficient Oil Displacement near the Chamber Edge in ES-SAGD, Journal of Petroleum Science and Engineering, Volume 118, pp. 99-113, June 2014. <http://dx.doi.org/10.1016/j.petrol.2014.04.007>
9. Okuno, R. and **Xu, Z.**, Efficient Displacement of Heavy Oil by Use of Three Hydrocarbon Phases, SPE Journal, Volume 19, Number 5, pp. 956-973, October 2014. <http://dx.doi.org/10.2118/165470-PA>
10. **Zhu, D.** and Okuno, R., A Robust Algorithm for Isenthalpic Flash of Narrow-Boiling Fluids, Fluid Phase Equilibria, Volume 379, pp. 26-51, October 15, 2014. <http://dx.doi.org/10.1016/j.fluid.2014.07.003>

11. Okuno, R. and **Xu, Z.**, Mass Transfer on Multiphase Transitions in Low-Temperature Carbon-Dioxide Floods, SPE Journal, Volume 19, Number 6, pp. 1005-1023, December 2014. <http://dx.doi.org/10.2118/166345-PA>
12. **Keshavarz, M.**, Okuno, R., and Babadagli, T., Optimal Application Conditions for Steam-Solvent Coinjection, SPE Reservoir Evaluation & Engineering, Volume 18, Number 1, pp. 20-38, February 2015. <http://dx.doi.org/10.2118/165471-PA>
13. **Keshavarz, M.**, Okuno, R., and Babadagli, T., A Semi-Analytical Solution to Optimize Single-Component Solvent Coinjection with Steam during SAGD, Fuel, Volume 144, pp. 400-414, March 15, 2015. <http://dx.doi.org/10.1016/j.fuel.2014.12.030>
14. **Kumar, A.** and Okuno, R., Direct Perturbation of the Peng-Robinson Attraction and Covolume Parameters for Reservoir Fluid Characterization, Chemical Engineering Science, Volume 127, pp. 293-309, May 4, 2015. <http://dx.doi.org/10.1016/j.ces.2015.01.032>
15. **Zhang, B.** and Okuno, R., Modeling of Capacitance Flow Behavior in EOS Compositional Simulation, Journal of Petroleum Science and Engineering, Volume 131, pp. 96-113, July 2015. <http://dx.doi.org/10.1016/j.petrol.2015.04.014>
16. **Venkatramani, A.** and Okuno, R., Characterization of Water-Containing Reservoir Oil using an EOS for Steam Injection Processes, Journal of Natural Gas Science & Engineering, Volume 26, pp. 1091-1106, September 2015. <http://dx.doi.org/10.1016/j.jngse.2015.07.036>
17. **Zhu, D.** and Okuno, R., Robust Isenthalpic Flash for Multiphase Water-Hydrocarbon Mixtures, SPE Journal, Volume 20, Number 6, pp. 1350-1365, December 2015. <http://dx.doi.org/10.2118/170092-PA>
18. **Zhu, D.** and Okuno, R., Multiphase Isenthalpic Flash Integrated with Stability Analysis, Fluid Phase Equilibria, Volume 423, pp. 203-219, September 15, 2016. <http://dx.doi.org/10.1016/j.fluid.2016.04.005>
19. **Kumar, A.** and Okuno, R., A New Algorithm for Multiphase Fluid Characterization for Solvent Injection, SPE Journal, Volume 21, Issue 5, October 2016. <http://dx.doi.org/10.2118/175123-PA>
20. **Kumar, A.** and Okuno, R., Reliable Characterization of Bitumen Based on Perturbation from n-Alkanes for Steam-Solvent Coinjection Simulation, Fuel, Volume 182, pp. 141-153, October 15, 2016. <http://dx.doi.org/10.1016/j.fuel.2016.05.095>
21. **Liu, Y.**, Li, H.A., and Okuno, R., Measurements and Modeling of Interfacial Tension for CO₂/CH₄/Brine Systems under Reservoir Conditions, Industrial & Engineering Chemistry Research, Volume 55, Issue 48, pp. 12358 – 12375, November 2016. <http://dx.doi.org/10.1021/acs.iecr.6b02446>
22. McGuire, P., Okuno, R., Gould, T., and Lake L.W., Ethane-Based EOR: An Innovative and Profitable EOR Opportunity for a Low Price Environment, SPE Reservoir Evaluation & Engineering, Volume 20, Issue 1, February 2017. <http://dx.doi.org/10.2118/179565-PA> (Featured in The American Oil & Gas Reporter as February 2017 Cover Story)
23. **Gao, J.**, Okuno, R., and Li, H.A., An Experimental Study of Multiphase Behavior for n-Butane/Bitumen/Water Mixtures, SPE Journal, Volume 22, Issue 3, June 2017. <http://dx.doi.org/10.2118/180736-PA>
24. **Venkatramani, A.** and Okuno, R., Compositional Mechanisms in SAGD and ES-SAGD with Consideration of Water Solubility in Oil, SPE Reservoir Evaluation & Engineering, Volume 20, Issue 3, August 2017. <http://dx.doi.org/10.2118/180737-PA>

Accepted, and available on-line

25. **Gao, J.**, Okuno, R., and Li, H.A., Phase-Behavior Study for n-Hexane/Bitumen and n-Octane/Bitumen Mixtures, SPE Journal, Accepted on March 6, 2017, Published online in July 2017. <https://doi.org/10.2118/186097-PA>
26. Okuno, R., **Zhu, D.**, **Shekhar, C.**, and **Eghbali, S.**, A Unified Algorithm for Phase-Stability/Split

Calculation for Multiphase PT Flash, SPE Journal, Accepted on July 13, 2017.

Under review

27. **Shi, X.** and Okuno, R., Analytical Solution for Steam-Assisted Gravity Drainage with Consideration of Temperature Variation along the Edge of a Steam Chamber, Submitted to Fuel, March 10, 2017.
28. **Liu, Y.**, Li, H.A., and Okuno, R., Phase Behavior of Fluid Mixtures in a Partially Confined Space, Submitted to Journal of Petroleum Science and Engineering, June 14, 2017.
29. **Sheng, K.**, Okuno, R., and Wang, M., Water-Soluble Solvent as an Additive to Steam for Improved SAGD, Submitted to SPE Journal, December 31, 2016.
30. **Venkatramani, A.** and Okuno, R., Steam-Solvent Coinjection under Reservoir Heterogeneity: Should ES-SAGD be Implemented for Highly Heterogeneous Reservoirs?, Submitted to SPE Journal, December 11, 2016.
31. **Venkatramani, A.** and Okuno, R., Mechanistic Simulation Study of Expanding-Solvent Steam-Assisted Gravity Drainage under Reservoir Heterogeneity, Submitted to SPE Reservoir Evaluation & Engineering, July 1, 2017.
32. **Neshat, S.**, Okuno, R., and Pope, G.A., A Rigorous Solution to the Problem of Phase Behavior in Unconventional Formations with High Capillary Pressure, Submitted to SPE Journal, July 11, 2017.

B. Refereed Conference Proceedings: (29)

Before Rank

1. Okuno, R., Johns, R.T., and Sepehrmoori, K., Use of a Reduced Method in Compositional Simulation, 11th European Conference on the Mathematics of Oil Recovery, September 8 – September 11, 2008, Bergen, Norway.
2. Okuno, R., Johns, R.T., and Sepehrmoori, K., A New Algorithm for Rachford-Rice for Multiphase Compositional Simulation, SPE Eastern Regional/AAPG Eastern Section Joint Meeting, October 11 – October 15, 2008, Pittsburgh, Pennsylvania, USA.
3. Okuno, R., Johns, R.T., and Sepehrmoori, K., Three-Phase Flash in Compositional Simulation Using a Reduced Method, 15th European Symposium on Improved Oil Recovery, April 27 – April 29, 2009, Paris, France.
4. Okuno, R., Johns, R.T., and Sepehrmoori, K., Mechanisms for High Displacement Efficiency of Low-Temperature CO₂ Floods, SPE Improved Oil Recovery Symposium, April 24 – April 28, 2010, Tulsa, Oklahoma, USA.
5. Sumikawa, I., Yamada, T., Okuno, R., Okabe, T., and Takahashi, T., Efficient Measurement of Diffusion Coefficients Using a PVT Cell, Journal of the Japanese Association for Petroleum Technology, Volume 75, Number 4, July 2010 (in Japanese).

In Rank

6. **Kumar, A.** and Okuno, R., Fluid Characterization using an EOS for Compositional Simulation of Enhanced Heavy-Oil Recovery, SPE Annual Technical Conference and Exhibition, October 8 – 10, 2012, San Antonio, Texas, USA.
7. **Iwasaki, S.**, Liang, Y., Matsuoka, T., Takahashi, S., and Okuno, R., Application of Gibbs Ensemble Monte Carlo to Phase Equilibria of CO₂/Hydrocarbon Mixtures, SPE International Petroleum Technology Conference, March 26 – 28, 2013, Beijing, China.
8. **Keshavarz, M.**, Okuno, R., and Babadagli, T., Optimal Application Conditions for Steam-Solvent Coinjection, SPE Heavy Oil Conference – Canada, June 11 – 13, 2013, Calgary, Alberta, Canada.

9. Okuno, R. and **Xu, Z.**, Efficient Displacement of Heavy Oil using Three Hydrocarbon Phases, SPE Heavy Oil Conference – Canada, June 11 – 13, 2013, Calgary, Alberta, Canada.
10. **Zhang, B.** and Okuno, R., A New Method for Modeling Bypassed Oil Recovery in EOS Compositional Simulation, SPE Annual Technical Conference and Exhibition, September 30 – October 2, 2013, New Orleans, LA, USA.
11. Okuno, R. and **Xu, Z.**, Mass Transfer on Multiphase Transitions in Low-Temperature CO₂ Floods, SPE Annual Technical Conference and Exhibition, September 30 – October 2, 2013, New Orleans, LA, USA.
12. **Kumar, A.** and Okuno, R., Universal Fluid Characterization Using an EOS Based on Perturbation from n-Alkanes, SPE Annual Technical Conference and Exhibition, September 30 – October 2, 2013, New Orleans, LA, USA.
13. **Venkatramani, A.** and Okuno, R., Modeling of Multiphase Behavior for Water/n-Alkane Mixtures by Use of the Peng-Robinson EOS, SPE Heavy Oil Conference – Canada, June 10 – 12, 2014, Calgary, Alberta, Canada.
14. **Zhu, D.** and Okuno, R., A Robust Algorithm for Multiphase Isenthalpic Flash, SPE Heavy Oil Conference – Canada, June 10 – 12, 2014, Calgary, Alberta, Canada.
15. **Zhu, D.** and Okuno, R., Analysis of Narrow-Boiling Behavior for Thermal Compositional Simulation, SPE Reservoir Simulation Symposium, February 23 – 25, 2015, Houston, Texas, USA.
16. **Xu, Z.** and Okuno, R., Numerical Simulation of Three-Hydrocarbon-Phase Flow with Robust Phase Identification, SPE Reservoir Simulation Symposium, February 23 – 25, 2015, Houston, Texas, USA.
17. **Kumar, A.** and Okuno, R., A New Algorithm for Multiphase Fluid Characterization for Solvent Injection, SPE Annual Technical Conference and Exhibition, September 28 – 30, 2015, Houston, Texas, USA.
18. **Eghbali, S.** and Okuno, R., Successive Substitution Augmented for Global Minimization of the Gibbs Free Energy, SPE Annual Technical Conference and Exhibition, September 28 – 30, 2015, Houston, Texas, USA.
19. McGuire, P.L., Okuno, R., Gould, T.L., and Lake, L.W., Ethane-Based EOR: An Innovative and Profitable EOR Opportunity for a Low Price Environment, SPE Improved Oil Recovery Symposium, April 9 – 13, 2016, Tulsa, Oklahoma, USA.
20. **Gao, J.**, Okuno, R., and Li, H., An Experimental Study of Four-Phase Behavior for n-Butane/Bitumen/Water Mixtures, SPE Canada Heavy Oil Technical Conference, June 7 – 9, 2016, Calgary, Alberta, Canada.
21. **Venkatramani, A.** and Okuno, R., Compositional Mechanisms in SAGD and ES-SAGD with Consideration of Water Solubility in Oil, SPE Canada Heavy Oil Technical Conference, June 7 – 9, 2016, Calgary, Alberta, Canada.
22. **Liu, Y.**, Li, H.A., and Okuno, R., Phase Behavior of Fluid Mixtures in a Partially Confined Space, SPE Annual Technical Conference and Exhibition, September 26 – 28, 2016, Dubai, UAE.
23. **Venkatraman, A.**, **Argüelles-Vivas, F.**, Okuno, R., Lake, L.W., and Wheeler, M.F., Modeling Impact of Aqueous Ions on Solubility of CO₂ and Its Implications for Sequestration and Enhanced Oil Recovery, SPE Annual Technical Conference and Exhibition, September 26 – 28, 2016, Dubai, UAE.
24. **Venkatramani, A.** and Okuno, R., Steam-Solvent Coinjection under Reservoir Heterogeneity: Should ES-SAGD be Implemented for Highly Heterogeneous Reservoirs?, SPE Canada Heavy Oil Technical Conference, February 15 – 16, 2017, Calgary, Alberta, Canada.
25. **Sheng, K.**, Okuno, R., and **Wang, M.**, Water-Soluble Solvent as an Additive to Steam for Improved SAGD, SPE Canada Heavy Oil Technical Conference, February 15 – 16, 2017,

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Calgary, Alberta, Canada.

26. **Baek, K., Argüelles-Vivas, F., Sheng, K.,** and Okuno, R., Comparative Study of Oil-Dilution Capability of Dimethyl Ether (DME) and Hexane as Steam Additives for CSS and SAGD, SPE Annual Technical Conference and Exhibition to be held 9 – 11 October, 2017, San Antonio, Texas, USA.
27. **Venkatramani, A.** and Okuno, R., Classification of Reservoir Heterogeneity for SAGD and ES-SAGD: Under What Type of Heterogeneity is ES-SAGD More Likely to Lower SOR?, SPE Annual Technical Conference and Exhibition to be held 9 – 11 October, 2017, San Antonio, Texas, USA.
28. **Neshat, S.,** Okuno, R., and Pope, G.A., A Rigorous Solution to the Problem of Phase Behavior in Unconventional Formations with High Capillary Pressure, SPE Annual Technical Conference and Exhibition to be held 9 – 11 October, 2017, San Antonio, Texas, USA.
29. **Jia, W.** and Okuno, R., Modeling of the Interaction Between Asphaltene and Water for Multiphase Reservoir Fluids by Use of Cubic-Plus-Association Equation of State, SPE Annual Technical Conference and Exhibition to be held 9 – 11 October, 2017, San Antonio, Texas, USA.

C. Other Major Publications

Software

In Rank

1. **Kumar, A.** and Okuno, R., EOS Fluid Characterization by Perturbation from n-Alkanes, October 2015.
2. **Kumar, A.** and Okuno, R., EOS Fluid Characterization by Direct Perturbation of Attraction and Covolume Parameters, April 2016.
3. **Zhu, D., Shekhar, C.,** and Okuno, R., Tangent-Plane Algorithm for Multiphase Flash Integrated with Stability Analysis, May 2017.

D. Technical Reports

1. Okuno, R., 2013. Modeling of Heavy-Oil/Bitumen Displacement Using the Solvent-Rich Liquid Phase in Solvent-Steam-Assisted Gravity Drainage, Japan Petroleum Exploration Co. Ltd., 1st annual report, September 2012 – August 2013
2. Okuno, R., 2013. Modeling of Multiphase Behavior Using an EOS for Solvent-SAGD Simulation, Society of Petroleum Engineers, Interim report, September 2012 – August 2013.
3. Okuno, R., 2014. Modeling of Heavy-Oil/Bitumen Displacement Using the Solvent-Rich Liquid Phase in Solvent-Steam-Assisted Gravity Drainage, Japan Petroleum Exploration Co. Ltd., Annual report, September 2013 – August 2014.
4. Okuno, R., 2014. Modeling of Multiphase Behavior Using an EOS for Solvent-SAGD Simulation, Society of Petroleum Engineers, Final report, September 2012 – August 2014.
5. Okuno, R., 2015. Thermodynamic Modelling of Water/Hydrocarbon Mixtures for Thermal Oil Recovery Simulation, Natural Sciences and Engineering Research Council of Canada (NSERC), Final report, September 2014 - August 2015.
6. Okuno, R., 2016. Modeling of Heavy-Oil/Bitumen Displacement Using the Solvent-Rich Liquid Phase in Solvent-Steam-Assisted Gravity Drainage, Japan Petroleum Exploration Co. Ltd., Annual report, September 2015 – August 2016.

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ORAL PRESENTATIONS:**A. Invited***In Rank*

1. Okuno, R., Multiphase Displacement of Oil in Solvent Injection, Petroleum Engineering Graduate Seminar at Texas A&M University, March 21, 2017.
2. Okuno, R., Lake, L.W., and Argüelles-Vivas, F. DME-Assisted Water Flooding for High-Temperature/High-Salinity Carbonate Reservoirs, Saudi Aramco/EXPEC ARC iQuest Event, Abu Dhabi, UAE, November 5 – 6, 2016.
3. Okuno, R., Oil Displacement in Three-Hydrocarbon-Phase Flow, Petroleum Engineering Graduate Seminar at University of Tulsa, Oklahoma, USA, November 4, 2016.
4. Okuno, R., Phase Behavior Research for Gas Enhanced Oil Recovery, Presentation at Technical Research Center of INPEX Corporation, Tokyo, Japan, July 28, 2016.
5. Okuno, R., Phase Behavior Research for Gas Enhanced Oil Recovery, Presentation at Technical Research Center of Japan Oil, Gas and Metals National Corporation, Chiba, Japan, July 27, 2016.
6. Okuno, R., Phase Behavior Research for Gas Enhanced Oil Recovery, Presentation at JX Nippon Oil & Energy Corporation, Tokyo, Japan, July 27, 2016.
7. Okuno, R., Steam-Solvent Coinjection for Bitumen Recovery, Presentation at Japan Petroleum Exploration Co., Ltd., Tokyo, Japan, July 25, 2016.
8. Okuno, R., Steam-Solvent Coinjection for Bitumen Recovery, Presentation at Japan Canada Oil Sands, Ltd., Calgary, Alberta, Canada, June 9, 2016.
9. Okuno, R., Compositional Reservoir Engineering, External Advisory Council meeting, Dept. of Petroleum and Geosystems Engineering, University of Texas at Austin, October 16, 2015.
10. Okuno, R., Reservoir Fluid Characterization, Petroleum Engineering Graduate Seminar at University of Texas at Austin, September 21, 2015.
11. Okuno, R., Compositional Reservoir Engineering, Research Showcase in Petroleum and Geosystems Engineering, University of Texas at Austin, September 8, 2015.
12. Okuno, R., Oil Displacement in Three-Hydrocarbon-Phase Flow, Petroleum Engineering Graduate Seminar at Stanford University, April 13, 2015.
13. Okuno, R., Oil Displacement in Three-Hydrocarbon-Phase Flow, Petroleum Engineering Graduate Seminar at the University of Texas at Austin, March 23, 2015.
14. Okuno, R., Compositional Flow Theory for Miscible/Thermal EOR, Petroleum Engineering Graduate Seminar at Louisiana State University, February 27, 2015.
15. Okuno, R., Thermodynamic Modeling for Simulation of Steam-Solvent Coinjection, Presentation for SPE Webinar, October 15, 2014.
16. Okuno, R., Discussion Leader for Session VII: Challenges in Reservoir Modeling and Surveillance of Unconventional Technologies in the SPE Forum on “Low Carbon Intensity Processes for Low-Mobility Oil Recovery”, Newport Beach, California, USA, July 27 – August 1, 2014.
17. Okuno, R., Fluid Characterization based on Perturbation from n-Alkanes, Presentation at Technical Research Center of Japan Oil, Gas and Metals National Corporation, Chiba, Japan, July 15, 2014.
18. Okuno, R., Thermodynamic Modeling for Simulation of Steam-Solvent Coinjection, Presentation at Japan Petroleum Exploration Co., Ltd., Tokyo, Japan, July 14, 2014.
19. Okuno, R., Fluid Characterization based on Perturbation from n-Alkanes, Presentation at INPEX

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Corporation, Tokyo, Japan, July 8, 2014.

20. Okuno, R., Recent Development in Gas Injection Theory, Schlumberger DBR Technology Centre, Edmonton, Alberta, March 26, 2014.
 21. Okuno, R., Thermodynamic Modeling for Simulation of Steam-Solvent Coinjection, Presentation at Japan Canada Oil Sands Ltd., Calgary, September 11, 2013.
 22. Okuno, R., Characterization of Reservoir Fluids Using an EOS, Presentation at INPEX Corporation, Tokyo, Japan, August 9, 2013.
 23. Okuno, R., Thermodynamic Modeling for Simulation of Steam-Solvent Coinjection, Presentation at Japan Petroleum Exploration Co., Ltd., Tokyo, Japan, July 16, 2013.
 24. Okuno, R., Thermodynamic Modeling for Simulation of Steam-Solvent Coinjection, Presentation for SPE Webinar, July 10, 2013.
 25. Okuno, R., Efficient and Robust Modeling of Phase Behavior for Compositional Simulation, Presentation at Computer Modelling Group Co., Ltd., Calgary, Alberta, February 28, 2013.
 26. Okuno, R., Miscible EOR, Presentation at Japan Petroleum Exploration Co., Tokyo, Japan, August 28, 2012.
 27. Okuno, R., Miscible EOR, Presentation at INPEX Corp., Tokyo, Japan, August 27, 2012.
 28. Okuno, R., Miscible EOR, Presentation at Technical Research Center of Japan Oil, Gas and Metals National Corporation, Chiba, Japan, August 24, 2012.
 29. Okuno, R., Miscible Methods in Heavy-Oil Recovery, Presentation for Kazan National Research Technological University, Edmonton, Alberta, July 3, 2012.
 30. Okuno, R., Efficient Oil Displacement Using the Solvent-Rich Liquid Phase, Presentation at Japan Oil, Gas and Metals National Corporation, Chiba, Japan, September 16, 2011.
 31. Okuno, R., Fundamentals of Compositional Reservoir Simulation and Gas Injection, Four-day short course at Kyoto University, Kyoto, Japan, September 12-15, 2011.
 32. Okuno, R., Modeling of Multiphase Behavior and Its Interaction with Flow for Enhanced Heavy-Oil Recovery, Presentation for the Petrotech Society (India), Alberta School of Business, Edmonton, Alberta, July 14, 2011.
- Before Rank
33. Okuno, R., Simultaneous Condensing/Vaporizing Mechanism in Low-Temperature CO₂ Floods, Committee meeting for The Japanese Association for Petroleum Technology, Tokyo, Japan, July 15, 2010.
 34. Okuno, R., Modeling of Multiphase Behavior for Gas Flooding Simulation, The University of Alberta, Edmonton, Alberta, Canada, May 21, 2010.
 35. Okuno, R., Gas Flooding Simulation, Japan – China CCS/EOR Workshop, Tokyo, Japan, April 5 – April 6, 2010.
 36. Okuno, R., Fundamentals of Gas Flooding, Japan Petroleum Exploration Co., Ltd., Tokyo, Japan, February 2, 2010.
 37. Okuno, R., Modeling of Multiphase Behavior for Gas Flooding Simulation, The University of Tokyo, Tokyo, Japan, January 27, 2010.
 38. Okuno, R., Fluid Characterization Using an Equation of State, Japan Petroleum Exploration Co. Ltd., Tokyo, Japan, January 5, 2010.
 39. Okuno, R., Thermodynamics and Phase Behavior in Petroleum Engineering, Japan Petroleum Exploration Co. Ltd., Tokyo, Japan, November 10, 2009.
 40. Okuno, R., Robust and Efficient Phase Behavior Algorithms for Compositional Simulation, Grant

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proposal to Abu Dhabi National Oil Company (ADNOC), Austin, Texas, USA, March 21, 2009.

41. Okuno, R., Three-Phase Flash in Compositional Simulation, Reservoir Simulation JIP meeting at the University of Texas at Austin, Austin, Texas, USA, February 27, 2009.
42. Okuno, R., UTCOMP Simulation Developments, Gas Flooding JIP meeting at the University of Texas at Austin, Austin, Texas, USA, September 25 – September 26, 2008.
43. Okuno, R., Johns, R.T., and Sepehrmoori, K., Phase Equilibrium for Compositional Simulation Using a Reduced Method, Grant proposal to oil companies, Austin, Texas, USA, May 28, 2008.
44. Okuno, R., Development of Simulation Toolkit, Gas Flooding JIP meeting at the University of Texas at Austin, Austin, Texas, USA, November 15 – November 16, 2007.
45. Okuno, R., Advanced Phase Behavior Modeling for Compositional Simulation, Gas Flooding JIP meeting at the University of Texas at Austin, Austin, Texas, USA, November 15 – November 16, 2007.

PATENTS:

- Okuno, R. "Coinjection of Dimethyl Ether and Steam for Bitumen and Heavy Oil Recovery," PCT Application Serial Number: PCT/US17/45724, U.S. Patent Application No. 15/670973, August 7, 2017.

GRANTS AND CONTRACTS :

Awarded while in rank (Okuno's share: USD 482,845 plus CAD 613,965)

PI Role	Co-investigators	Agency	Grand Total	Okuno's Share	Grant Period	Institution
1 "Enhanced Oil Recovery"						
PI	None	Japan Petroleum Exploration	\$115,878	\$115,878	09/01/15-8/31/17	UT Austin
2 "Bitumen Recovery"						
PI	None	Japan Canada Oil Sands	\$76,967	\$76,967	09/01/15-06/30/17	UT Austin
3 "Minimum Miscibility Estimation for Multiphase Oil Displacement by Solvent"						
PI	None	Gas Enhanced Oil Recovery JIP – Various Donors	\$100,000	\$100,000	09/01/15-08/31/17	UT Austin
4 "Alkaline Solvent for SAGD and CSS"						
PI	None	Chemical Enhanced Oil Recovery JIP – Various Donors	\$150,000	\$150,000	06/01/16-05/31/18	UT Austin
5 "Infrastructure for Phase Behavior Studies at High Temperature-Pressure Conditions"						
PI	None	Canada Foundation for Innovation	C\$149,745	C\$149,745	04/01/15-08/31/15	Univ. of Alberta
6 "Thermodynamic Modeling of Water/Hydrocarbon Mixtures for Thermal Oil Recovery Simulation"						
PI	None	Natural Science and Engineering Research Council of Canada (NSERC)	C\$140,750	C\$140,750	09/01/14-08/31/15	Univ. of Alberta

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7 "Modeling of Heavy-Oil Displacement Using the Solvent-Rich Liquid Phase in Solvent SAGD"						
PI	None	Japan Petroleum Exploration	C\$203,470	C\$203,470	09/01/12-08/31/15	Univ. of Alberta
8 "Modeling of Multiphase Behavior using an EOS for Solvent-SAGD Simulation"						
PI	None	Society of Petroleum Engineers	\$40,000	\$40,000	09/01/12-08/31/14	Univ. of Alberta
9 "Numerical Modeling for Improved Steam-Assisted Gravity Drainage"						
PI	None	Natural Science and Engineering Research Council of Canada (NSERC)	C\$120,000	C\$120,000	04/01/12-08/31/15	Univ. of Alberta
		Subtotal Okuno's share		US\$482,845+ C\$613,965		

* These grants were awarded to me out of the larger JIP projects run by Dr. Kishore Mohanty (No. 3) and Dr. Gary Pope (No. 4). I gave research presentations to their annual meetings, and the proposals were evaluated and approved by the JIP members and PIs.

Forthcoming grants and contracts (Okuno's share: \$266,811)

PI Role	Co-investigators	Agency	Grand Total	Okuno's Share	Grant Period	Status
1 "Solvent-Assisted Smart Water Flooding for High-Temperature/High-Salinity Carbonate Reservoirs"						
PI	Co-PI Lake, L.W.	Saudi Aramco	\$199,000	\$187,780	09/01/17-08/31/18	Contract being finalized
2 "Fluid Characterization for CO ₂ Flooding"						
PI	None	JX Nippon Oil & Gas Exploration	\$10,251	\$10,251	09/01/17-08/31/18	Contract being finalized
3 "PVT Laboratory Study"						
PI	Co-PI Lake, L.W.	Occidental Petroleum	\$80,000	\$68,780	09/01/17-03/31/18	Awaiting for installment
		Subtotal Okuno's share	\$289,251	\$266,811		

PH.D. SUPERVISIONS COMPLETED:

Name	Year	Title	Department	Institution
Venkatramani, Arun Venkat	2017	Steam-Solvent Coinjection for Bitumen Recovery under Reservoir Heterogeneity with Consideration of Water Solubility in Oil	Petroleum Engineering	University of Alberta
Kumar, Ashutosh	2015	Characterization of Reservoir Fluids based on Perturbation from n-Alkanes	Petroleum Engineering	University of Alberta

M.S. SUPERVISIONS COMPLETED:

Name	Year	Title	Department	Institution
Shi, Xiaoxing	2016	Analytical Solution for SAGD with Consideration of Temperature Variation along the Edge of a Steam Chamber	Petroleum Engineering	University of Alberta
Gao, Jianyi	2016 Co-supervised by Li, H.	An Experimental Study of Multiphase Behavior for Athabasca-Bitumen/Alkane-Solvent Mixtures	Petroleum Engineering	University of Alberta
Sheng, Kai	2016	Analysis of Phase Behavior for Steam-Solvent Coinjection for Bitumen Recovery	Petroleum Engineering	University of Alberta
Xu, Zhongguo	2016	Numerical Study of Oil Displacement by Three Hydrocarbon Phases	Petroleum Engineering	University of Alberta
Venkatramani, Arun Venkat	2014	Modeling of Water-Containing Reservoir Oil for Steam Injection Simulation	Petroleum Engineering	University of Alberta
Zhang, Bo	2014	Modeling of Bypassed Oil Recovery in EOS Compositional Simulation	Petroleum Engineering	University of Alberta
Keshavarz, Mohsen	2013 Co-supervised by Babadagli, T.	Mechanistic Simulation Study of Steam-Solvent Coinjection for Bitumen and Heavy-Oil Recovery	Petroleum Engineering	University of Alberta

PH.D. IN PROGRESS:**A. Students admitted to candidacy**

- Zhu, Di, Ph.D. expected December 2017

B. Post M.S. students preparing to take Ph.D. qualifying exam

All passed PhD qualifying, but not all passed preliminary.

- Baek, Kwang Hoon, Ph.D. candidacy expected November 2017, Ph.D. expected 2019
- Neshat, Sajjad (co-supervised with Pope, G.A.), Ph.D. candidacy expected November 2017, Ph.D. expected 2019
- Wang, Mingyuan, Ph.D. candidacy expected 2018, Ph.D. expected 2020
- Sheng, Kai, Ph.D. candidacy expected 2018, Ph.D. expected 2020
- Achour, Sophiane, Ph.D. candidacy expected 2019, Ph.D. expected 2021

M.S. IN PROGRESS:

- Hernandez-Mejia, Jose, M.S. expected 2019

POSTDOCTORAL FELLOWS SUPERVISED:

- Francisco Javier Argüelles Vivas, January 2016 – present.

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- Wenlong Jia, August 2016 – July 2017.
- Francisco Javier Argüelles Vivas, August 2015 – November 2015.

CONTINUING EDUCATION:

- PGE 387L “Fundamentals of Enhanced Oil Recovery II” by Dr. Gary A. Pope, UT Austin, Spring 2017 (Attended nearly 90%).
- Workshop “Statistical Analysis of Laboratory Data” by American Chemical Society held at Lone Star Corporate College, Houston, TX, December 6 – 8, 2016.
- Workshop “Write Winning Grant Proposals” by, John D. Robertson, Ph.D., held at Univ. of Texas at Austin, October 4, 2016.
- Workshop “Thermal Enhanced Oil Recovery” by Society of Petroleum Engineers, Houston, TX, November 30 – December 2, 2011.

VITA:

Ryosuke Okuno is an assistant professor in the Department of Petroleum & Geosystems Engineering at the University of Texas at Austin. Before his current position, he served as an assistant professor of Petroleum Engineering in the Department of Civil & Environmental Engineering at the University of Alberta from 2010 to 2015. Okuno also has seven years of industrial experience as a reservoir engineer with Japan Petroleum Exploration Co., Ltd., and is a registered Professional Engineer in Alberta, Canada. His research and teaching interests include enhanced oil recovery, thermal oil recovery, unconventional resources, numerical reservoir simulation, thermodynamics, multiphase behavior, and applied mathematics. Okuno is a recipient of the 2012 SPE Petroleum Engineering Junior Faculty Research Initiation Award, an Associate Editor for SPE Journal, and holds the Pioneer Corporation Faculty Fellowship in Petroleum Engineering at the University of Texas at Austin. He holds bachelor's and master's degrees in Geosystem Engineering from the University of Tokyo, and a PhD degree in Petroleum Engineering from the University of Texas at Austin.

Email: okuno@utexas.edu

Candidate's Summary of Activities

(in rank for assistant professor; since last promotion for associate professors)

Ryosuke Okuno, Ph.D., P.Eng.

Metric	Value
Peer-reviewed journal publications (in rank and total)	22 / 26
Peer-reviewed conference proceedings (in rank and total)	24 / 29
Number of journal papers in rank with supervised student(s) from UT as co-author	19 (UA) / 2 (UT)
Total citations of all publications (career) from ISI Web of Knowledge	106
h-index (career) from ISI Web of Knowledge	6
Total citations of all publications (career) from Google Scholar or Publish or Perish	382
h-index (career) from Google Scholar or Publish or Perish	11
Total external research funding raised in rank	USD 482,845 + CAD 613,965
Total external research funding raised in rank (candidate's share)	USD 482,845 + CAD 613,965
Total number of external grants/contracts awarded in rank	9
Number of external grants/contracts awarded in rank as PI	7
PhD students completed†	2 (2 sole advisor)
MS students completed†	6 (5 sole advisor)
PhD students in pipeline (as of 09/2017) †	5.5 (5 sole advisor)
MS students in pipeline (as of 09/2017) †	1 (1 sole advisor)
Number of courses taught	18
Total number of students taught in organized courses	595 (501 at UA and 94 at UT)
Average instructor evaluation for UG courses	4.0 at UA and 4.4 at UT
Average instructor evaluation for Grad courses	4.0 at UA and 3.9 at UT
Average course evaluation for UG courses	4.0 at UT
Average course evaluation for Grad courses	3.8 at UT
Number of teaching awards	0
Student organizations advised	2 (SPE student chapter at Univ. of Alberta, and local high school, Sherwood Park, AB, Canada)
Undergraduate researchers supervised	3
Service on journal editorial boards	2 (SPE Journal, and Journal of Natural Gas Science & Engineering)
Number of symposia organized	0

† Count a student as 1.0 if sole supervisor and 0.5 if co-supervised.

Complete reverse chronological list of publications and scholarly/creative works

Ryosuke Okuno, Ph.D., P.Eng.

Title of Dissertation: Modeling of Multiphase Behavior for Gas Flooding Simulation

Dissertation Advisor: Russell T. Johns and Kamy Sepehrnoori

Section I. Works published, in press, accepted, or under contract while in current rank at UT Austin.

Rank: Assistant Professor

Number of refereed journal publication: 10

Number of conference papers: 14

Number of software pieces: 3

Number of patents: 1

A. Refereed Journal Publications

1. Okuno, R., **Zhu, D., Shekhar, C., and Eghbali, S.** (Accepted) A Unified Algorithm for Phase-Stability/Split Calculation for Multiphase PT Flash. *SPE Journal*. Accepted on July 13, 2017.

Co-authors: Zhu, Di, doctoral student at UT Austin; Shekhar, Chandra, Master student at UT Austin; Eghbali, Sara, doctoral student at UA

Qualitative statement of contribution: Di and Chandra are students at UT Austin under my sole supervision. Sara was a doctoral student under my sole supervision at UA until 2015. I invented and developed the algorithm. The three students developed computer programs based on the algorithm. I made the first draft for this paper, and am the corresponding author.

Citations: 0 (Google Scholar)

2. **Gao, J.,** Okuno, R., and Li, H.A. (Accepted) Phase-Behavior Study for n-Hexane/Bitumen and n-Octane/Bitumen Mixtures. *SPE Journal*. Accepted on March 6, 2017, Published online in July 2017. <https://doi.org/10.2118/186097-PA>

Co-authors: Gao, Jianyi, Master student at UA; Li, Huazhou Andy, faculty at UA

Qualitative statement of contribution: Jianyi was a MS student at UA under the co-supervision of myself and Dr. Li. Jianyi conducted experiments and made the first draft for this paper. I played the primary role in supervising her and editing the manuscript as the corresponding author.

Citations: 0 (Google Scholar)

3. **Venkatramani, A.** and Okuno, R. Compositional Mechanisms in SAGD and ES-SAGD with Consideration of Water Solubility in Oil. *SPE Reservoir Evaluation & Engineering*. Volume 20, Issue 3, August 2017. <http://dx.doi.org/10.2118/180737-PA>

Co-authors: Venkatramani, Arun Venkat, doctoral student at UA

Qualitative statement of contribution: Arun was a doctoral student at UA under my sole supervision. Arun conducted numerical simulation studies, analyzed simulation results, and made the first draft. I edited the manuscript as the corresponding author.

Citations: 2 (Google Scholar)

4. **Gao, J.,** Okuno, R., and Li, H.A. An Experimental Study of Multiphase Behavior for n-Butane/Bitumen/Water Mixtures. *SPE Journal*. Volume 22, Issue 3, June 2017. <http://dx.doi.org/10.2118/180736-PA>

Co-authors: Gao, Jianyi, Master student at UA; Li, Huazhou Andy, faculty at UA

Qualitative statement of contribution: Jianyi was a MS student at UA under the co-supervision of myself and Dr. Li. Jianyi conducted experiments and made the first draft for this paper. I played the primary role in supervising her and editing the manuscript as the corresponding author.

Citations: 3 (Google Scholar)

5. McGuire, P., Okuno, R., Gould, T., and Lake L.W. Ethane-Based EOR: An Innovative and Profitable EOR Opportunity for a Low Price Environment. *SPE Reservoir Evaluation & Engineering*. Volume 20, Issue 1, February 2017. <http://dx.doi.org/10.2118/179565-PA> (Featured in The American Oil & Gas Reporter as February 2017 Cover Story)

Co-authors: McGuire, Patrick, International Reservoir Technologies; Gould, Thomas, International Reservoir Technologies; Lake, Larry W., faculty peer at UT Austin

Qualitative statement of contribution: Patrick conducted numerical reservoir simulations and made the first draft for the paper. I provided the phase behavior models used for the simulations, and also conducted calculations of minimum miscibility pressures for case studies. I and the other co-authors edited the draft from Patrick.

Citations: 1 (Google Scholar)

6. **Liu, Y.,** Li, H.A., and Okuno, R. Measurements and Modeling of Interfacial Tension for CO₂/CH₄/Brine Systems under Reservoir Conditions. *Industrial & Engineering Chemistry Research*. Volume 55, Issue 48, pp. 12358 – 12375, November 2016. <http://dx.doi.org/10.1021/acs.iecr.6b02446>

Co-authors: Liu, Yueliang, doctoral student at UA; Li, Huazhou Andy, faculty at UA

Qualitative statement of contribution: Yueliang is a doctoral student at UA. At the publication time, he was co-supervised by myself and Dr. Li. Yueliang conducted experiments and made the first draft for this paper. Dr. Li and I edited the manuscript. Dr. Li is the corresponding author.

Citations: 2 (Google Scholar)

7. **Kumar, A.** and Okuno, R. Reliable Characterization of Bitumen Based on Perturbation from n-Alkanes for Steam-Solvent Coinjection Simulation. *Fuel*. Volume 182, pp. 141-153, October 15, 2016. <http://dx.doi.org/10.1016/j.fuel.2016.05.095>

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 3 (Google Scholar)

8. **Kumar, A.** and Okuno, R. A New Algorithm for Multiphase Fluid Characterization for Solvent Injection. *SPE Journal*. Volume 21, Issue 5, October 2016. <http://dx.doi.org/10.2118/175123-PA>

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 5 (Google Scholar)

9. **Zhu, D.** and Okuno, R. Multiphase Isenthalpic Flash Integrated with Stability Analysis. *Fluid Phase Equilibria*. Volume 423, pp. 203-219, September 15, 2016.
<http://dx.doi.org/10.1016/j.fluid.2016.04.005>

Co-authors: Zhu, Di, doctoral student at UT Austin

Qualitative statement of contribution: Di is a doctoral student under my sole supervision at UT Austin. Di created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 3 (Google Scholar)

10. **Zhu, D.** and Okuno, R. Robust Isenthalpic Flash for Multiphase Water-Hydrocarbon Mixtures, *SPE Journal*. Volume 20, Number 6, pp. 1350-1365, December 2015.
<http://dx.doi.org/10.2118/170092-PA>

Co-authors: Zhu, Di, doctoral student at UA

Qualitative statement of contribution: Di is a doctoral student under my sole supervision. She was at UA at the publication time, but is now at UT Austin. Di created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 4 (Google Scholar)

B. Conference Proceedings

1. **Jia, W.** and Okuno, R. Modeling of the Interaction Between Asphaltene and Water for Multiphase Reservoir Fluids by Use of Cubic-Plus-Association Equation of State. SPE Annual Technical Conference and Exhibition to be held 9 – 11 October, 2017, San Antonio, Texas, USA.

Co-authors: Jia, Wenlong, post-doctoral fellow at UT Austin

Qualitative statement of contribution: Wenlong is a post-doctoral fellow under my sole supervision. Wenlong created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

2. **Neshat, S.,** Okuno, R., and Pope, G.A. A Rigorous Solution to the Problem of Phase Behavior in Unconventional Formations with High Capillary Pressure. SPE Annual Technical Conference and Exhibition to be held 9 – 11 October, 2017, San Antonio, Texas, USA.

Co-authors: Neshat, Sajjad, doctoral student at UT Austin; Pope, Gary A., faculty at UT Austin

Qualitative statement of contribution: Sajjad is a doctoral student under the co-supervision of myself and Dr. Pope. Sajjad created research results and made the first draft for this paper. I and Dr. Pope edited the manuscript.

3. **Venkatramani, A.** and Okuno, R. Classification of Reservoir Heterogeneity for SAGD and ES-SAGD: Under What Type of Heterogeneity is ES-SAGD More Likely to Lower SOR? SPE Annual Technical Conference and Exhibition to be held 9 – 11 October, 2017, San Antonio, Texas, USA.

Co-authors: Venkatramani, Arun Venkat, doctoral student at UA

Qualitative statement of contribution: Arun was a doctoral student at UA under my sole supervision. Arun conducted numerical simulation studies, analyzed simulation results, and made the first draft. I edited the manuscript as the corresponding author.

4. **Baek, K., Sheng, K., Argüelles-Vivas, F.,** and Okuno, R. Comparative Study of Oil-Dilution Capability of Dimethyl Ether (DME) and Hexane as Steam Additives for SAGD. SPE Annual Technical Conference and Exhibition to be held 9 – 11 October, 2017, San Antonio, Texas, USA.

Co-authors: Baek, Kwang Hoon, doctoral student at UT Austin; Sheng, Kai, doctoral student at UT Austin; Argüelles-Vivas, Francisco, post-doctoral fellow at UT Austin

Qualitative statement of contribution: Kwang Hoon and Kai are doctoral students at UT Austin under my sole supervision. Francisco is a post-doctoral fellow at UT Austin under my sole supervision. Kwang Hoon and Kai conducted experiments with Francisco under my supervision. Kwang Hoon made the first draft. I edited the manuscript as the corresponding author.

5. **Sheng, K.,** Okuno, R., and **Wang, M.** Water-Soluble Solvent as an Additive to Steam for Improved SAGD. SPE Canada Heavy Oil Technical Conference, February 15 – 16, 2017, Calgary, Alberta, Canada.

Co-authors: Sheng, Kai, doctoral student at UT Austin; Wang, Mingyuan, doctoral student at UT Austin

Qualitative statement of contribution: Kai and Mingyuan are doctoral students at UT Austin under my sole supervision. Kai made research results and made the first draft for this publication. Mingyuan made a small part of research results. I edited the manuscript as the corresponding author.

Citations: 0 (Google Scholar)

6. **Venkatramani, A.** and Okuno, R. Steam-Solvent Coinjection under Reservoir Heterogeneity: Should ES-SAGD be Implemented for Highly Heterogeneous Reservoirs? SPE Canada Heavy Oil Technical Conference, February 15 – 16, 2017, Calgary, Alberta, Canada.

Co-authors: Venkatramani, Arun Venkat, doctoral student at UA

Qualitative statement of contribution: Arun was a doctoral student at UA under my sole supervision. Arun conducted numerical simulation studies, analyzed simulation results, and made the first draft. I edited the manuscript as the corresponding author.

Citations: 0 (Google Scholar)

7. **Venkatraman, A., Argüelles-Vivas, F.,** Okuno, R., Lake, L.W., and Wheeler, M.F. Modeling Impact of Aqueous Ions on Solubility of CO₂ and Its Implications for Sequestration and Enhanced Oil Recovery, SPE Annual Technical Conference and Exhibition, September 26 – 28, 2016, Dubai, UAE.

Co-authors: Venkatraman, Ashwin, post-doctoral fellow at UT Austin; Argüelles-Vivas, Francisco, post-doctoral fellow at UT Austin; Lake, Larry W., faculty at UT Austin; Wheeler, Marry F., faculty at UT Austin

Qualitative statement of contribution: Ashwin was a doctoral student at UT Austin under Dr. Wheeler. Francisco is a post-doctoral fellow at UT Austin under my sole supervision. Ashwin and Francisco created research results. Ashwin made the first draft. I edited the manuscript.

Citations: 0 (Google Scholar)

8. **Liu, Y.,** Li, H.A., and Okuno, R. Phase Behavior of Fluid Mixtures in a Partially Confined Space. SPE Annual Technical Conference and Exhibition, September 26 – 28, 2016, Dubai, UAE.

Co-authors: Liu, Yueliang, doctoral student at UA; Li, Huazhou Andy, faculty at UA

Qualitative statement of contribution: Yueliang is a doctoral student at UA. At the publication time, he was co-supervised by myself and Dr. Li. Yueliang conducted experiments and made the first draft for this paper. Dr. Li and I edited the manuscript, and Dr. Li is the corresponding author.

Citations: 0 (Google Scholar)

9. **Venkatramani, A.** and Okuno, R. Compositional Mechanisms in SAGD and ES-SAGD with Consideration of Water Solubility in Oil. SPE Canada Heavy Oil Technical Conference, June 7 – 9, 2016, Calgary, Alberta, Canada.

Co-authors: Venkatramani, Arun Venkat, doctoral student at UA

Qualitative statement of contribution: Arun was a doctoral student at UA under my sole supervision. Arun conducted numerical simulation studies, analyzed simulation results, and made the first draft. I edited the manuscript as the corresponding author.

Citations: 2 (Google Scholar)

10. **Gao, J.,** Okuno, R., and Li, H. An Experimental Study of Four-Phase Behavior for n-Butane/Bitumen/Water Mixtures. SPE Canada Heavy Oil Technical Conference, June 7 – 9, 2016, Calgary, Alberta, Canada.

Co-authors: Gao, Jianyi, Master student at UA; Li, Huazhou Andy, faculty at UA

Qualitative statement of contribution: Jianyi was a MS student at UA under the co-supervision of myself and Dr. Li. Jianyi conducted experiments and made the first draft for this paper. I played the primary role in supervising her and editing the manuscript as the corresponding author.

Citations: 0 (Google Scholar)

11. McGuire, P.L, Okuno, R., Gould, T.L., and Lake, L.W. Ethane-Based EOR: An Innovative and Profitable EOR Opportunity for a Low Price Environment. SPE Improved Oil Recovery Symposium, April 9 – 13, 2016, Tulsa, Oklahoma, USA.

Co-authors: McGuire, Patrick, International Reservoir Technologies; Gould, Thomas, International Reservoir Technologies; Lake, Larry W., faculty peer at UT Austin

Qualitative statement of contribution: Patrick conducted numerical reservoir simulations and made the first draft for the paper. I provided the phase behavior models used for the

simulations, and also conducted calculations of minimum miscibility pressures for case studies. I and the other co-authors edited the draft from Patrick.

Citations: 3 (Google Scholar)

12. **Eghbali, S.** and Okuno, R. Successive Substitution Augmented for Global Minimization of the Gibbs Free Energy. SPE Annual Technical Conference and Exhibition, September 28 – 30, 2015, Houston, Texas, USA.

Co-authors: Eghbali, Sara, doctoral student at UA

Qualitative statement of contribution: Sara was a doctoral student at UA under my sole supervision at the publication time. I invented the algorithm. Sara developed the computer program, and made the first draft. I edited the manuscript as the corresponding author.

Citations: 0 (Google Scholar)

13. **Kumar, A.** and Okuno, R. A New Algorithm for Multiphase Fluid Characterization for Solvent Injection. SPE Annual Technical Conference and Exhibition, September 28 – 30, 2015, Houston, Texas, USA.

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 0 (Google Scholar)

C. Software

1. **Zhu, D., Shekhar, C.,** and Okuno, R. Tangent-Plane Algorithm for Multiphase Flash Integrated with Stability Analysis. May 2017.

Co-authors: Zhu, Di, doctoral student at UT Austin; Shekhar, Chandra, master student at UT Austin

Qualitative statement of contribution: Di and Chandra are students under my sole supervision. They made a computer program with me. I invented the algorithm.

2. **Kumar, A.** and Okuno, R. EOS Fluid Characterization by Direct Perturbation of Attraction and Covolume Parameters. April 2016.

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh made the computer program with me.

3. **Kumar, A.** and Okuno, R. EOS Fluid Characterization by Perturbation from n-Alkanes. October 2015.

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh made the computer program with me.

D. Patent

1. Okuno, R. Coinjection of Dimethyl Ether and Steam for Bitumen and Heavy Oil Recovery. PCT Application Serial Number: PCT/US17/45724, U.S. Patent Application No. 15/670973, August 7, 2017.

Section 2. Works published (or in equivalent status) while in current rank at other institutions (if applicable)

Rank: Assistant Professor at the University of Alberta

Number of refereed journal publication: 16

Number of conference papers: 11

A. Refereed Journal Publications

11. **Zhang, B.** and Okuno, R. Modeling of Capacitance Flow Behavior in EOS Compositional Simulation. *Journal of Petroleum Science and Engineering*. Volume 131, pp. 96-113, July 2015. <http://dx.doi.org/10.1016/j.petrol.2015.04.014>

Co-authors: Zhang, Bo, master student at UA

Qualitative statement of contribution: Bo was a master student at UA under my sole supervision at the publication time. Bo created research results and made the first draft for this publication. I edited the manuscript as the corresponding author.

Citations: 2 (Google Scholar)

12. **Kumar, A.** and Okuno, R. Direct Perturbation of the Peng-Robinson Attraction and Covolume Parameters for Reservoir Fluid Characterization. *Chemical Engineering Science*. Volume 127, pp. 293-309, May 4, 2015. <http://dx.doi.org/10.1016/j.ces.2015.01.032>

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 8 (Google Scholar)

13. **Venkatramani, A.** and Okuno, R. Characterization of Water-Containing Reservoir Oil using an EOS for Steam Injection Processes. *Journal of Natural Gas Science & Engineering*. Volume 26, pp. 1091-1106, September 2015. <http://dx.doi.org/10.1016/j.jngse.2015.07.036>

Co-authors: Venkatramani, Arun Venkat, master student at UA

Qualitative statement of contribution: Arun was a master student at UA under my sole supervision at the publication time. Arun analyzed experimental data from the literature, and created an optimized set of binary interaction parameters for an equation of state to represent the data. I edited the manuscript as the corresponding author.

Citations: 9 (Google Scholar)

14. **Keshavarz, M.**, Okuno, R., and Babadagli, T. A Semi-Analytical Solution to Optimize Single-Component Solvent Coinjection with Steam during SAGD. *Fuel*. Volume 144, pp. 400-414, March 15, 2015. <http://dx.doi.org/10.1016/j.fuel.2014.12.030>

Co-authors: Keshavarz, Mohsen, master student at UA; Babadagli, Tayfun, faculty at UA

Qualitative statement of contribution: Mohsen was a master student at UA under the co-supervision of myself and Dr. Babadagli. Mohsen created research results and made the first draft for this publication. I played the primary role in supervising him and editing the manuscript, and am as the corresponding author.

Citations: 13 (Google Scholar)

15. **Keshavarz, M.**, Okuno, R., and Babadagli, T. Optimal Application Conditions for Steam-Solvent Coinjection. *SPE Reservoir Evaluation & Engineering*. Volume 18, Number 1, pp. 20-38, February 2015. <http://dx.doi.org/10.2118/165471-PA>

Co-authors: Keshavarz, Mohsen, master student at UA; Babadagli, Tayfun, faculty at UA

Qualitative statement of contribution: Mohsen was a master student at UA under the co-supervision of myself and Dr. Babadagli. Mohsen created research results and made the first draft for this publication. I played the primary role in supervising him and editing the manuscript, and am as the corresponding author.

Citations: 37 (Google Scholar)

16. Okuno, R. and **Xu, Z.** Mass Transfer on Multiphase Transitions in Low-Temperature Carbon-Dioxide Floods. *SPE Journal*. Volume 19, Number 6, pp. 1005-1023, December 2014. <http://dx.doi.org/10.2118/166345-PA>

Co-authors: Xu, Zhongguo, master student at UA

Qualitative statement of contribution: Zhongguo was a master student at UA under my sole supervision. He conducted reservoir simulations and made figures. I derived analytical theory and analyzed simulation results. I wrote the manuscript.

Citations: 5 (Google Scholar)

17. **Zhu, D.** and Okuno, R. A Robust Algorithm for Isenthalpic Flash of Narrow-Boiling Fluids. *Fluid Phase Equilibria*. Volume 379, pp. 26-51, October 15, 2014. <http://dx.doi.org/10.1016/j.fluid.2014.07.003>

Co-authors: Zhu, Di, doctoral student at UA

Qualitative statement of contribution: Di is a doctoral student under my sole supervision. She was at UA at the publication time, but is now at UT Austin. Di created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 8 (Google Scholar)

18. Okuno, R. and **Xu, Z.** Efficient Displacement of Heavy Oil by Use of Three Hydrocarbon Phases. *SPE Journal*. Volume 19, Number 5, pp. 956-973, October 2014. <http://dx.doi.org/10.2118/165470-PA>

Co-authors: Xu, Zhongguo, master student at UA

Qualitative statement of contribution: Zhongguo was a master student at UA under my sole supervision. He conducted reservoir simulations and made figures. I derived analytical theory and analyzed simulation results. I wrote the manuscript.

Citations: 12 (Google Scholar)

19. **Keshavarz, M.,** Okuno, R., and Babadagli, T. Efficient Oil Displacement near the Chamber Edge in ES-SAGD. *Journal of Petroleum Science and Engineering*. Volume 118, pp. 99-113, June 2014. <http://dx.doi.org/10.1016/j.petrol.2014.04.007>

Co-authors: Keshavarz, Mohsen, master student at UA; Babadagli, Tayfun, faculty at UA

Qualitative statement of contribution: Mohsen was a master student at UA under the co-supervision of myself and Dr. Babadagli. Mohsen created research results and made the first draft for this publication. I played the primary role in supervising him and editing the manuscript, and am as the corresponding author.

Citations: 17 (Google Scholar)

20. **Kumar, A.** and Okuno, R. Reservoir Oil Characterization for Compositional Simulation of Solvent Injection Processes. *Industrial & Engineering Chemistry Research*. Volume 53, Number 1, pp. 440-455, 2014. <http://dx.doi.org/10.1021/ie402198z>

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 4 (Google Scholar)

21. **Kumar, A.** and Okuno, R. Characterization of Reservoir Fluids using an EOS Based on Perturbation from n-Alkanes. *Fluid Phase Equilibria*. Volume 358, pp. 250-271, November 25, 2013. <http://dx.doi.org/10.1016/j.fluid.2013.08.035>

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 16 (Google Scholar)

22. **Kumar, A.** and Okuno, R. Critical Parameters Optimized for Accurate Phase Behavior Modeling for Heavy n-Alkanes up to C100 using the Peng-Robinson Equation of State. *Fluid Phase Equilibria*. Volume 335, pp. 46-59, December 15, 2012. <http://dx.doi.org/10.1016/j.fluid.2012.07.029>

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 19 (Google Scholar)

23. Okuno, R., Johns, R.T., and Sepehrnoori, K. Three-Phase Flash in Compositional Simulation Using a Reduced Method. *SPE Journal*. Volume 15, Number 3, pp. 689-703, September 2010. <http://dx.doi.org/10.2118/125226-PA>
24. Okuno, R., Johns, R.T., and Sepehrnoori, K. A New Algorithm for Rachford-Rice for Multiphase Compositional Simulation. *SPE Journal*. Volume 15, Number 2, pp. 313-325, June 2010. <http://dx.doi.org/10.2118/117752-PA>
25. Okuno, R., Johns, R.T., and Sepehrnoori, K. Three-Phase Flash in Compositional Simulation Using a Reduced Method. *SPE Journal*. Volume 15, Number 3, pp. 689-703, September 2010. <http://dx.doi.org/10.2118/125226-PA>
26. Okuno, R., Johns, R.T., and Sepehrnoori, K. Mechanisms for High Displacement Efficiency of Low-Temperature CO₂ Floods. *SPE Journal*. Volume 16, Number 4, pp. 751-767, December 2011.

B. Conference Proceedings

27. **Xu, Z.** and Okuno, R. Numerical Simulation of Three-Hydrocarbon-Phase Flow with Robust Phase Identification, SPE Reservoir Simulation Symposium, February 23 – 25, 2015, Houston, Texas, USA.

Co-authors: Xu, Zhongguo, master student at UA

Qualitative statement of contribution: Zhongguo was a master student at UA under my sole supervision. He made a computer program and created simulation results. I edited the first draft that Zhongguo wrote. I am the corresponding author.

Citations: 1 (Google Scholar)

28. **Zhu, D.** and Okuno, R. Analysis of Narrow-Boiling Behavior for Thermal Compositional Simulation. SPE Reservoir Simulation Symposium, February 23 – 25, 2015, Houston, Texas, USA.

Co-authors: Zhu, Di, doctoral student at UA

Qualitative statement of contribution: Di is a doctoral student under my sole supervision. She was at UA at the publication time, but is now at UT Austin. Di created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 3 (Google Scholar)

29. **Zhu, D.** and Okuno, R. A Robust Algorithm for Multiphase Isenthalpic Flash. SPE Heavy Oil Conference – Canada, June 10 – 12, 2014, Calgary, Alberta, Canada.

Co-authors: Zhu, Di, doctoral student at UA

Qualitative statement of contribution: Di is a doctoral student under my sole supervision. She was at UA at the publication time, but is now at UT Austin. Di created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 3 (Google Scholar)

30. **Venkatramani, A.** and Okuno, R. Modeling of Multiphase Behavior for Water/n-Alkane Mixtures by Use of the Peng-Robinson EOS, SPE Heavy Oil Conference – Canada, June 10 – 12, 2014, Calgary, Alberta, Canada.

Co-authors: Venkatramani, Arun Venkat, master student at UA

Qualitative statement of contribution: Arun was a master student at UA under my sole supervision at the publication time. Arun analyzed experimental data from the literature, and created an optimized set of binary interaction parameters for an equation of state to represent the data. I edited the manuscript as the corresponding author.

Citations: 3 (Google Scholar)

31. **Kumar, A.** and Okuno, R. Universal Fluid Characterization Using an EOS Based on Perturbation from n-Alkanes. SPE Annual Technical Conference and Exhibition, September 30 – October 2, 2013, New Orleans, LA, USA.

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 1 (Google Scholar)

32. Okuno, R. and **Xu, Z.** Mass Transfer on Multiphase Transitions in Low-Temperature CO₂ Floods. SPE Annual Technical Conference and Exhibition, September 30 – October 2, 2013, New Orleans, LA, USA.

Co-authors: Xu, Zhongguo, master student at UA

Qualitative statement of contribution: Zhongguo was a master student at UA under my sole supervision. He conducted reservoir simulations and made figures. I derived analytical theory and analyzed simulation results. I wrote the manuscript.

Citations: 3 (Google Scholar)

33. **Zhang, B.** and Okuno, R. A New Method for Modeling Bypassed Oil Recovery in EOS Compositional Simulation. SPE Annual Technical Conference and Exhibition, September 30 – October 2, 2013, New Orleans, LA, USA.

Co-authors: Zhang, Bo, master student at UA

Qualitative statement of contribution: Bo was a master student at UA under my sole supervision at the publication time. Bo created research results and made the first draft for this publication. I edited the manuscript as the corresponding author.

Citations: 3 (Google Scholar)

34. Okuno, R. and **Xu, Z.** Efficient Displacement of Heavy Oil using Three Hydrocarbon Phases. SPE Heavy Oil Conference – Canada, June 11 – 13, 2013, Calgary, Alberta, Canada.

Co-authors: Xu, Zhongguo, master student at UA

Qualitative statement of contribution: Zhongguo was a master student at UA under my sole supervision. He conducted reservoir simulations and made figures. I derived analytical theory and analyzed simulation results. I wrote the manuscript.

Citations: 2 (Google Scholar)

35. **Keshavarz, M.,** Okuno, R., and Babadagli, T. Optimal Application Conditions for Steam-Solvent Coinjection. SPE Heavy Oil Conference – Canada, June 11 – 13, 2013, Calgary, Alberta, Canada.

Co-authors: Keshavarz, Mohsen, master student at UA; Babadagli, Tayfun, faculty at UA

Qualitative statement of contribution: Mohsen was a master student at UA under the co-supervision of myself and Dr. Babadagli. Mohsen created research results and made the first draft for this publication. I played the primary role in supervising him and editing the manuscript, and am as the corresponding author.

Citations: 0 (Google Scholar)

36. **Iwasaki, S.,** Liang, Y., Matsuoka, T., Takahashi, S., and Okuno, R. Application of Gibbs Ensemble Monte Carlo to Phase Equilibria of CO₂/Hydrocarbon Mixtures. SPE International Petroleum Technology Conference, March 26 – 28, 2013, Beijing, China.

Co-authors: Iwasaki, Satoshi, master student at University of Kyoto; Liang, Yunfeng, faculty at University of Kyoto; Matsuoka, Toshifumi, faculty at University of Kyoto; Takahashi, Satoru, Japan Oil, Gas, Metals National Corporation.

Qualitative statement of contribution: Satoshi was a master student at University of Kyoto under Dr. Matsuoka's supervision. Satoshi and Dr. Liang created research results and made the first draft for this publication. I provided example cases, and was actively involved in editing the manuscript.

Citations: 1 (Google Scholar)

37. **Kumar, A.** and Okuno, R. Fluid Characterization using an EOS for Compositional Simulation of Enhanced Heavy-Oil Recovery. SPE Annual Technical Conference and Exhibition, October 8 – 10, 2012, San Antonio, Texas, USA.

Co-authors: Kumar, Ashutosh, doctoral student at UA

Qualitative statement of contribution: Ashutosh was a doctoral student at UA under my sole supervision. Ashutosh created research results and made the first draft for this paper. I edited the manuscript, and am the corresponding author.

Citations: 6 (Google Scholar)

Section 3. Works published (or in equivalent status) while in previous rank(s) at UT Austin (if applicable)

Rank: Graduate Research Assistant

Number of conference papers: 3

B. Conference Proceedings

38. Okuno, R., Johns, R.T., and Sepehrnoori, K. Three-Phase Flash in Compositional Simulation Using a Reduced Method. 15th European Symposium on Improved Oil Recovery, April 27 – April 29, 2009, Paris, France.
39. Okuno, R., Johns, R.T., and Sepehrnoori, K. A New Algorithm for Rachford-Rice for Multiphase Compositional Simulation. SPE Eastern Regional/AAPG Eastern Section Joint Meeting, October 11 – October 15, 2008, Pittsburgh, Pennsylvania, USA.
40. Okuno, R., Johns, R.T., and Sepehrnoori, K. Use of a Reduced Method in Compositional Simulation. 11th European Conference on the Mathematics of Oil Recovery, September 8 – September 11, 2008, Bergen, Norway.

Section 4. Works published (or in equivalent status) while in previous rank(s) at other institutions (if applicable)

Rank: Reservoir Engineer at Japan Petroleum Exploration

Number of refereed journal publication: 1

Number of conference papers: 2

A. Refereed Journal Publications

41. Okuno, R., Johns, R.T., and Sepehrnoori, K. Application of a Reduced Method in Compositional Simulation. *SPE Journal*. Volume 15, Number 1, pp. 39-49, March 2010. <http://dx.doi.org/10.2118/119657-PA>

B. Conference Proceedings

42. Okuno, R., Johns, R.T., and Sepehrnoori, K. Mechanisms for High Displacement Efficiency of Low-Temperature CO₂ Floods. SPE Improved Oil Recovery Symposium, April 24 – April 28, 2010, Tulsa, Oklahoma, USA.
43. Sumikawa, I., Yamada, T., Okuno, R., Okabe, T., and Takahashi, T. Efficient Measurement of Diffusion Coefficients Using a PVT Cell. *Journal of the Japanese Association for Petroleum Technology*, Volume 75, Number 4, July 2010 (in Japanese).

7/13/2017

UTmail Mail - SPE Journal - Approved for Publication on Manuscript SJ-0517-0028.R1



Ryosuke Okuno <okuno@utexas.edu>

SPE Journal - Approved for Publication on Manuscript SJ-0517-0028.R1

SPE Journal <onbehalfof+peer+spe.org@manuscriptcentral.com>

Thu, Jul 13, 2017 at 12:34 AM

Reply-To: peer@spe.org

To: okuno@utexas.edu

13-Jul-2017

Dear Ryosuke:

I am pleased to inform you that your manuscript "A Unified Algorithm for Phase-Stability/Split Calculation for Multiphase PT Flash" has been accepted for publication in a future issue of SPE Journal. The SPE paper number assigned to your manuscript is SPE-175060-PA. It will be scheduled for publication in a future issue of SPE Journal.

Your paper will be submitted for copy editing by SPE's professional editing staff, and you will have the opportunity to review any changes resulting from that edit. Should any outstanding documentation or information be required, you will be contacted by the SPE Editorial Office.

Thank you for taking the time to revise your paper and make it acceptable for publication. We look forward to your continued contributions to SPE Journal.

Sincerely,
Knut-Andreas Lie
Executive Editor, SPE Journal

Final Comments from Executive Editor:

Thank you for your cooperation. Congratulations with an accepted manuscript!

3/6/2017

UTmail Mail - SPE Journal - Approved for Publication on Manuscript SJ-0916-0010.R1 / SPE-186097-PA



Ryosuke Okuno <okuno@utexas.edu>

SPE Journal - Approved for Publication on Manuscript SJ-0916-0010.R1 / SPE-186097-PA

SPE Journal <onbehalf+peer+spe.org@manuscriptcentral.com>

Mon, Mar 6, 2017 at 3:04 PM

Reply-To: peer@spe.org

To: okuno@utexas.edu

06-Mar-2017

Dear Ryosuke:

I am pleased to inform you that your manuscript "A Phase-Behavior Study for n-Hexane/Bitumen and n-Octane/Bitumen Mixtures" has been accepted for publication in a future issue of SPE Journal. The SPE paper number assigned to your manuscript is SPE-186097-PA. It will be scheduled for publication in a future issue of SPE Journal.

Your paper will be submitted for copy editing by SPE's professional editing staff, and you will have the opportunity to review any changes resulting from that edit. Should any outstanding documentation or information be required, you will be contacted by the SPE Editorial Office.

Thank you for taking the time to revise your paper and make it acceptable for publication. We look forward to your continued contributions to SPE Journal.

Sincerely,
Randall Seright
Executive Editor, SPE Journal

Technical Editor (Comments to the Author):

Originality and Significance: To the best of my knowledge this work and results are novel.

Technical Content: Technical details are thorough and clear.

Ease of Understanding: Good layout and paper length.

I appreciate the efforts put in by the authors in revising the manuscript and making the suggested modifications. I am happy with the updated version and support publishing.

Final Comments from Executive Editor: Congratulations and thanks for your paper!

**PGE Budget Council Statement
For
Ryosuke Okuno, Ph.D.**

Teaching Contribution & Effectiveness

Portfolio

Dr. Okuno taught for 10 semesters from 2010 to 2015 at the University of Alberta (Edmonton, Alberta, Canada) before joining the PGE department at UT Austin in August 2015. He taught 501 students at the University of Alberta with an average instructor rating of 4.0/5.0 for 4 different courses:

PETE 477 Modeling in Petroleum Engineering (Undergrad)
PETE 478 Thermal Methods in Heavy Oil Recovery (Undergrad)
PETE 694 Advanced Thermodynamics and Phase Behavior (Grad)
PETE 484 Oil and Gas Property Evaluation (Undergrad on an ad-hoc basis).

After joining the faculty at UT Austin, he has taught 94 students for 4 semesters with an average rating of 4.2/5.0 (Instructor) and 3.9/5.0 (Course) for 2 different courses:

PGE 427 Properties of Petroleum Fluids (Undergrad)
PGE 384 Advanced Thermodynamics and Phase Behavior (Grad).

PGE 427 is a required undergraduate course in PGE with both laboratory and lecture components. Dr. Okuno made major improvements in how this course is taught as part of a PGE curriculum change implemented during the Fall of 2016. The course is now taught in a way that fully integrates classical thermodynamics with fluid properties and with the laboratory. He helped design and implement new laboratory experiments. Previously the lab experiments were part of a third course in the thermodynamics/fluids sequence.

PGE 384 is a graduate course in PGE. Dr. Okuno has taught graduate level advanced thermodynamics and phase behavior at both the University of Alberta and UT-Austin. He is exceptionally well qualified to teach this course. The subject matter of this course is closely aligned with his primary technical expertise and research. Advanced thermodynamics is an abstract science that most graduate students find difficult and challenging. To the great benefit of our students, Dr. Okuno teaches this difficult material with rigor and clarity based on his deep understanding of the subject.

Comparative Rankings

A summary of Dr. Okuno's course evaluations is given in Table 1.

Table 1. Summary of Course-Instructor Ratings

Metric	Value
Total # of students taught in organized courses	595 (501 at UA and 94 at UT)
Average instructor evaluation for UG courses	4.0 at UA and 4.4 at UT
Average instructor evaluation for Grad courses	4.0 at UA and 3.9 at UT
Average course evaluation for UG courses	4.0 at UT
Average course evaluation for Grad courses	3.8 at UT

A comparison of Dr. Okuno's course evaluations at UT-Austin with the CSE average and with other instructors in PGE is given in Table 2. His undergraduate instructor ratings are higher than the PGE and CSE averages of 4.2. His graduate instructor ratings are slightly below the PGE and CSE averages. His undergraduate course ratings average out to be equivalent to the PGE and CSE averages, as do his graduate course ratings. Considering these are both very difficult courses (undergraduate petroleum fluid phase behavior with lab and graduate thermodynamics), these are commendable ratings.

Table 2: Comparison with average instructor evaluations

Course/ Semester	PGE 427 f15	PGE 384 s16	PGE 427 f16	PGE 384 s17	PGE Avg f15-s17	CSE Avg f15-s17
Instructor Rating	4.4	3.8	4.4	3.9	4.2	4.2
Course Rating	3.8	4.0	4.2	3.7	4.0	3.9

Graduate Students

Dr. Okuno currently supervises six PhD students (one co-supervised) and one post-doctoral fellow. He has supervised two PhD students who have graduated and seven MS students who have graduated (two co-supervised). He has also supervised the research of three undergraduate students. In addition to supervising his own students, Dr. Okuno has served on 28 PhD committees.

Classroom Audits

Professor Gary Pope audited Dr. Okuno's graduate PGE 384 class on Thermodynamics and Phase Behavior on April 6 and 8, 2016 and his undergraduate PGE 427 class on Properties of Petroleum Fluids on November 17 and 22, 2016. The following is a summary of his observations.

Dr. Okuno knows the subject matter of these courses very well and conveyed it very clearly to the students. He interacted with the students both by asking them questions and by answering their questions very clearly and succinctly. His lectures were extremely well organized. Our students are very fortunate to have such a dedicated, knowledgeable and effective teacher.

Thermodynamics and Phase Behavior is one of the most abstract and difficult subjects we teach in Petroleum Engineering. It was obvious that the students in his class were motivated and engaged. His interaction with them during class was clearly very effective.

Dr. Okuno's lectures on the Properties of Petroleum Fluids (PGE 427) were exceptionally clear and well organized. He provided a handout to assist the second year students with some of the more difficult material in the textbook. The class material he provided on Canvas was very well done. His explanation of the PVT properties of petroleum fluids was excellent. The classical Black Oil model of live crude oils is significantly different than what is encountered in traditional textbooks on thermodynamics and phase behavior. Thus, many new definitions and concepts must be introduced. Dr. Okuno did an excellent job with precisely the right pace and interaction with the students during class.

Experience

Dr. Okuno has about 7 years of experience working in the E&P industry including more than 5 years near oil and gas fields. Based on this experience, he knows what types of equipment and techniques are used in drilling, production, well-testing, and surface facilities, and what is involved in field development. This experience and perspective inform his teaching of petroleum engineering to the great benefit of PGE students.

Concluding Remarks

Based on student comments, CIS comparative rankings, peer evaluation and evidence of continuous improvement, Dr. Okuno's teaching record meets or exceeds expectations for promotion.



Kamy Sepahnoori, Chair
PGE Tenure and Promotion Committee



Mukul M. Sharma



Eric van Oort



Gary Pope, Ad Hoc Committee Member

Candidate's Summary of Teaching

Ryosuke Okuno, Ph.D., P.Eng.

Overview

I am a petroleum engineer with 6 years and 10 months of industrial experience in addition to a Ph.D. degree in petroleum engineering. Within the time period spent in the E&P industry, I worked for 5 years and 4 months near oil/gas fields, and developed various technical skills. With actual working experience in oil fields, I know what types of equipment/tools and techniques are used in drilling, production, well-testing, and surface facilities, and what is involved in reservoir engineering for field development (not to mention how field engineers' lives are and what it feels like working in oil fields). One of my responsibilities was to design, coordinate, and implement well testing for new and existing oil/gas wells, and then analyze well-test data to serve for efficient field development. It was my desire to have such detailed field experience after going through the highest level of education in Japan at the University of Tokyo. It was indeed worth the time I spent working in the industry so now I can teach petroleum engineering at the University of Texas at Austin (UT Austin) in the Department of Petroleum and Geosystems Engineering (PGE) based on my field experience. This is a very important part of my attributes as a teacher at UT PGE.

Furthermore, I taught at the University of Alberta (Edmonton, Alberta, Canada) for 10 semesters from the fall of 2010 through the winter (called spring at UT Austin) of 2015 before joining UT Austin in August 2015. Alberta's oil industry is the most intensive practitioner of thermal enhanced oil recovery (EOR), which is the most widely used EOR method in the world. The academic experience at the University of Alberta broadened my teaching knowledge in petroleum engineering. My industrial experience coupled with my academic education and teaching experience in different countries with different technical focuses makes me confident as a teacher at all levels.

I taught 501 students at the University of Alberta for 10 semesters with an average instructor rating of 4.0/5.0 for 4 different courses:

PETE 477 Modeling in Petroleum Engineering (Undergrad)
 PETE 478 Thermal Methods in Heavy Oil Recovery (Undergrad)
 PETE 694 Advanced Thermodynamics and Phase Behavior (Grad)
 PETE 484 Oil and Gas Property Evaluation (Undergrad on an ad-hoc basis).

At UT Austin, I have taught 94 students for 4 semesters with an average rating of 4.2/5.0 (Instructor) and 3.9/5.0 (Course) for 2 different courses:

PGE 427 Properties of Petroleum Fluids (Undergrad)
 PGE 384 Advanced Thermodynamics and Phase Behavior (Grad).

Dynamic environments at oil fields (especially at well-testing sites) and higher-level engineering as a reservoir engineer taught me the importance of identifying primary factors affecting the technical problems of interest. My academic education gave me a systematic framework to find and solve practical engineering problems. My teaching philosophy is influenced by my professional experience.

My primary goal is to teach students how to become responsible engineers who can solve new engineering problems, and recognize the limitations of their approach. The education that I provide as a professor should be of long-lasting value considering a wide variety of future technical challenges the students will face. To achieve my goal, I not only teach fundamental engineering knowledge, but also the methods and procedures needed for the solution of difficult and challenging engineering problems.

All courses I teach begin with a survey of the relationship between the subject and actual work in the petroleum industry with photos and figures that visually stimulate students' curiosities. Each of the courses

has its main set of fundamental concepts, from which practical examples are derived. Such examples are then given as projects and homework to reinforce the concepts taught. These examples are discussed in class to ensure students' solid understanding. Thus, important points are repeated in different forms (e.g., formal lecture, homework, in-class discussion, and pre-exam review) with examples throughout the semester.

My goal is to help students become good problem solvers so that they will excel and advance in their future careers, which will include academic and research careers in some instances. My industrial experience greatly helps me understand and convey to the students the practical importance of the fundamental knowledge they are being taught. Problems encountered in the industry typically have many unknowns. My experience in the industry indicates that many people attempt to consider simultaneously many factors that affect the problem solutions. I teach a proper methodology of how to solve complicated problems. In advanced thermodynamics and phase behavior, for example, I emphasize thermodynamic fundamentals (i.e., the first and second laws) to explain phase behavior of reservoir fluids and compositional reservoir simulation. I teach that they can derive particular formulations for phase behavior problems of interest on their own once they understand the fundamentals.

My approach includes reading assignments of journal papers. In the thermodynamics course that I teach (both undergraduate and graduate), students are asked to find phase behavior data of a particular system, and compare predictions from an equation of state with the data. They learn how to quantitatively describe the accuracy of a model, and why reliable characterization of fluids is important.

Undergraduate Courses

PGE 427 Properties of Petroleum Fluids

This is a 4-credit sophomore course with lab and lecture components. I joined UT PGE during the recent change of PGE's undergraduate course curriculum. As part of change in the curriculum, two courses in the previous curriculum, Physical Chemistry (PGE 421K) and Physical and Chemical Behavior of Fluids (PGE 312), were merged into PGE 427. My understanding of the curriculum change is as follows:

(a) Teaching material

The petroleum fluids course (PGE 312) had been taught based on an outdated framework, in which petroleum fluids are viewed as mixtures of "gas" and "oil". This is not only inaccurate in many ways, but also confusing to modern petroleum engineers mainly because different types of fluid behavior are not explained in a unified manner. This is one of the problems that I myself encountered as a petroleum engineer more than 15 years ago. Although I had to follow largely the old teaching style for the fall of 2015 (right after my move from Alberta), I made major changes for the fall of 2016. The course is now taught in a consistent manner following classical thermodynamics. Students can reinforce the main knowledge from thermodynamics in various ways; for example, experimental labs, and homework exercises to calculate fluid properties by use of commercial software. I believe this change substantially improved students' learning experience. The course rating was improved from 3.8 (fall 2015) to 4.2 (fall 2016) while keeping 4.4 for the instructor rating.

(b) Experimental content

The existing labs were prepared for the old curriculum. Although much of the material could be used for PGE 427 after minor refinements, there were several issues with the teaching lab material. Dr. David DiCarlo and I designed three new labs: viscosity measurement, molecular weight measurement, and bubble-point measurement. The viscosity and molecular weight labs were implemented in PGE 427 in the spring semester of 2017. The bubble-point lab will be implemented in PGE 427 in the fall semester of 2017. With the help of a post-doc, I designed an in-house visual cell and prepared equipment to make a simple, safe setup for this lab. This will greatly enhance students' learning with visual observation of phase transitions of petroleum fluids. They will learn how phase behavior data are measured. We plan to submit a paper on this new educational experiment in a peer-reviewed journal.

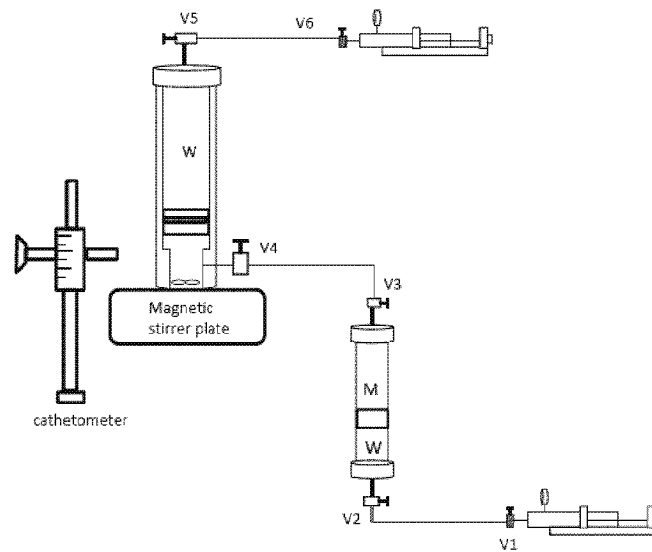
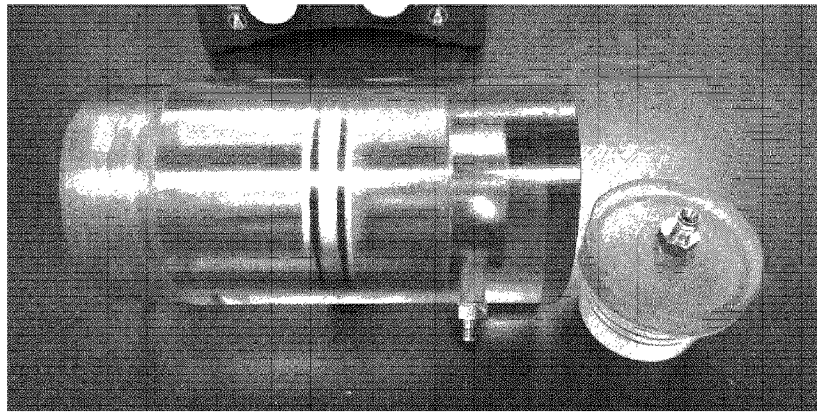
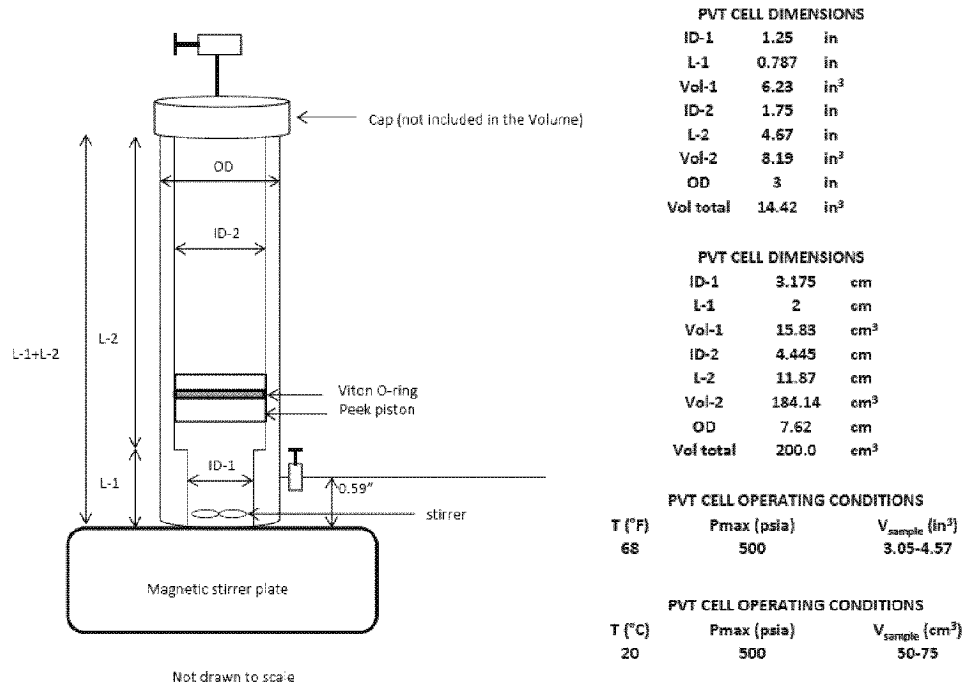


Figure 1. Setup for constant mass expansion for bubble-point measurement.



(b)

Figure 2. (a) Design of the polycarbonate visual cell for phase behavior experiment. (b) Photo of the visual cell.

Graduate Courses

PGE 384 Advanced Thermodynamics and Phase Behavior

PGE 384 is the graduate thermodynamics course in the PGE department. It is based on chemical engineering thermodynamics with the main focus on multicomponent phase equilibria and characterization of petroleum fluids using an equation of state. I have taught this course for 6 semesters (4 at Alberta and 2 at UT Austin) so far, and the fundamental part of the course is well developed. The last 20% of the course is usually spent covering advanced topics, for which I typically select emerging technical problems, such as phase behavior in small pores, and advanced equations of state for complex phase behavior, such as phase behavior of oils with asphaltenes. These advanced topics serve as excellent examples to demonstrate the generality of the fundamental principles of thermodynamics. This course is perhaps the most fundamental and general course taught in the department. It is also perhaps the most rigorous and demanding course taught in PGE, which is sometimes reflected in the students' comments with respect to work load.

Continuing Education

I attended nearly 90% of the course on Enhanced Oil Recovery by Dr. Gary A. Pope in the spring of 2017. Although I realize different instructors have different teaching styles, this gave me various ideas to improve my teaching.

Table 1. Summary of Course-Instructor Ratings

Metric	Value
Total # of students taught in organized courses	595 (501 at UA and 94 at UT)
Average instructor evaluation for UG courses	4.0 at UA and 4.4 at UT
Average instructor evaluation for Grad courses	4.0 at UA and 3.9 at UT
Average course evaluation for UG courses	4.0 at UT
Average course evaluation for Grad courses	3.8 at UT

Table 2. Course Schedule by Semester**University of Alberta**

Course	F 10	S 11	F 11	S 12	F 12	S 13	F 13	S 14	F 14	S 15
PETE 484	7									
PETE 477		57		43		49		53		54
PETE 478				28		44		54		52
PETE 694			27		8		10		15	

University of Texas at Austin

Course	F 15	S 16	F 16	S 17
PGE 427	29		30	
PGE 384		13		22

**Table 3. Summary of Graduate Students Currently Supervised at UT Austin
(as of 09/01/2017)**

Student Name	Co-Supervisor*	Degree	Start Date	Date Reached Candidacy	Date Expected to Reach Candidacy	Expected Graduation Date
Di Zhu*	-	PhD	09/2012	Spring 2017		Fall 2017
Kwang Hoon Baek	-	PhD	09/2015		Fall 2017	Spring 2019
Mingyuan Wang	-	PhD	09/2016		Spring 2018	Spring 2020
Kai Sheng	-	PhD	09/2016		Spring 2018	Spring 2020
Sajjad Sadeghi Neshat	G.A. Pope, PGE	PhD	09/2016		Fall 2017	Fall 2019
Sofiane Achour	-	PhD	09/2017		Spring 2019	Spring 2021
Jose Hernandez-Mejia	-	MS	09/2017			Summer 2019

* Di Zhu completed her PhD candidacy exam at the University of Alberta on December 8, 2014, but transferred to UT Austin in January 2016. After passing all qualifying exams in January 2017, she successfully passed her PhD research proposal at UT Austin on May 2, 2017. She has published three peer-reviewed papers under my supervision so far.

Ryosuke Okuno
 Department of Petroleum and Geosystems Engineering
Course Rating Averages

Tenure candidates must include all years in rank.

All other candidates must include, at minimum, the three most recent years

What source was used to complete this chart? Summary provided by Provost's Office
 (e.g., My CIS, summary provided by Provost's Office, etc.)

PGE 427: Properties of Petroleum Fluids

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Fall 2015	29	23	4.4	3.8
Fall 2016	30	14	4.4	4.2
Mean	30	19	4.4	4.0

PGE 384: Advanced Thermodynamics & Phase Behavior

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Spring 2016	13	12	3.8	4.0
Spring 2017	22	15	3.9	3.7
Mean	18	14	3.9	3.9

Course Instructor Survey Results

Name/EID: OKUNO, RYOSUKE (ro859)

Department: Petroleum/Geosys Engr

Report Date: 07-21-2017

Semester	Unique Number	Course Number	Course Title	Instruction Type	Enrollment	No. of Surveys Returned	Avg. Overall Instructor Rating	Avg. Overall Course Rating
Fall 2015	19060	PGE 427	PROPERTIES OF PETROLEUM FLUIDS	Organized	29	23	4.4	3.8
Spring 2016	19480	PGE 384	ADV THERMODYNAM & PHASE BEHAV	Organized	13	12	3.8	4
Fall 2016	19180	PGE 427	PROPERTIES OF PETROLEUM FLUIDS	Organized	30	14	4.4	4.2
Spring 2017	19355	PGE 384	ADV THERMODYNAM & PHASE BEHAV	Organized	22	15	3.9	3.7

Okuno ClS_Ratings 072117

Date: April 17, 2017

To: Jon Olson, Chair, Department of Petroleum & Geosystems Engineering

From: Gary A. Pope, Texaco Centennial Chair and Professor

Subject: Peer Evaluation of Dr. Ryosuke Okuno

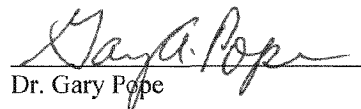
I attended Okuno's graduate PGE 384 class on Thermodynamics and Phase Behavior on April 6 and 8, 2016 and his undergraduate PGE 427 class on Properties of Petroleum Fluids on November 17 and 22, 2016. This is a report of my observations.

Dr. Okuno knows the subject matter of these courses very well and conveyed it very clearly to the students. He interacted with the students both by asking them questions and by answering their questions very clearly and succinctly. I found all of his lectures to be extremely well organized. Our students are very fortunate to have such a dedicated, knowledgeable and effective teacher.

Thermodynamics and Phase Behavior is one of the most abstract and difficult subjects we teach in Petroleum Engineering. I have taught this course myself many times over the years so I appreciate the challenge involved in motivating the students and conveying the difficult material in a clear way. It was obvious that the students in his class were motivated and engaged. His interaction with them during class was clearly very effective. I met with Dr. Okuno after each teaching observation and provided immediate feedback to him.

Dr. Okuno's lectures on the Properties of Petroleum Fluids (PGE 427) were exceptionally clear and well organized. He provided a handout to assist the second year students with some of the more difficult material in the textbook. I also found the class material he provided on Canvas to be very well done. His lecture was one of the best explanations of the PVT properties of petroleum fluids that I have ever had the pleasure to observe. The classical Black Oil model of live crude oils is significantly different than what is encountered in traditional textbooks on thermodynamics and phase behavior. Thus, many new definitions and concepts are introduced. Dr. Okuno did an excellent job with precisely the right pace and interaction with the students during class. I met with Dr. Okuno after each teaching observation and provided immediate feedback to him. My only concern was that initially he tolerated a greater lack of discipline among a few of the students than I would have or that I consider acceptable. After I provided this feedback to him, he decided to give pop quizzes at the beginning of his class to encourage prompt attendance. We have also met to discuss his teaching on other occasions since I am his mentor. I have shown this document to Dr. Okuno and we have discussed it.

My overall evaluation is that Dr. Okuno is an excellent teacher for both undergraduate and graduate students in Petroleum Engineering.


Dr. Gary Pope

09/02/17
PROGRAM GSPBFRP3THE UNIVERSITY OF TEXAS AT AUSTIN
OFFICE OF GRADUATE STUDIES
COMMITTEE REPORT, MASTERS AND DOCTORAL
FOR OKUNO, RYOSUKE

PAGE: 94

Petroleum & Geosystems Engineering

NAME	EID	LAST SEM	COMM POSITION	MAST OR DOCT	DEGREE	FIELD	YYS	2ND DEGREE	FIELD	YYS
BATISTA FERNANDES, B. R.	brb2398	172	MEMBER	D						
BIHANI, ABHISHEK DILIP	adb3379	179	MEMBER	M	M.S.E.	PETROLEUM ENG	20162			
DONG, RENCHENG	rd27243	179	MEMBER	D						
ISBELL, JORDAN TAYLOR	jt1234	166	MEMBER	M	M.S.E.	PETROLEUM ENG	20166			
KUMAR, ASHISH	ak29697	179	MEMBER	D						
LEE, HYUNG JOO	hl5488	179	MEMBER	D						
MEHRABI, MEHRAN	mm77954	179	MEMBER	D						
O'KEEFE, SEAN PATRICK	so6645	172	MEMBER	D	PH.D.	CHEMICAL ENGI	20172			
XU, YIFEI	yx2785	179	MEMBER	D						
ZHU, DI	dz4322	176	CHAIR	D						

Ryosuke Okuno, Ph.D., P.Eng.

**Department of Petroleum and Geosystems Engineering
List of Postdoctoral Fellows Supervised**

1. Francisco Javier Argüelles Vivas, Ph.D. Petroleum Engineering, University of Texas at Austin, January 2016 – present.
2. Wenlong Jia, Ph.D., Petroleum Engineering, University of Texas at Austin, August 1, 2016 – July 31, 2017. Ph.D.
3. Francisco Javier Argüelles Vivas, Ph.D. Petroleum Engineering, University of Alberta, August 2015 – November 2015.

Dr. Francisco Javier Argüelles Vivas received his PhD degree in Petroleum Engineering from University of Alberta, Edmonton, Alberta, Canada, in November 2015.

Dr. Wenlong Jia received his PhD degree in Oil & Gas Storage and Transportation Engineering from Southwest Petroleum University, Chengdu, China, in June 2014.

PGE Budget Council Statement

For

Ryosuke Okuno, Ph.D.

Research, Publications & Other Evidence of Scholarship/Creativity

PROMOTION CANDIDATE'S ACADEMIC/RESEARCH BACKGROUND

Dr. Okuno holds bachelor's and master's degrees in Geosystem Engineering from the University of Tokyo, and a PhD degree in Petroleum Engineering from the University of Texas at Austin. He was an assistant professor of Petroleum Engineering in the Department of Civil & Environmental Engineering at the University of Alberta from 2010 to 2015. He also has seven years of industrial experience as a reservoir engineer with Japan Petroleum Exploration Co., Ltd., and is a registered Professional Engineer in Alberta, Canada.

AREAS OF RESEARCH

Dr. Ryosuke Okuno's main field of research is phase behavior and thermodynamics and their application to enhanced oil recovery and other important problems in petroleum engineering. He has successfully addressed many challenging research questions about the interplay between subsurface flow and multiphase behavior for oil recovery.

Dr. Okuno is a recognized leader in theory and modeling of multiphase behavior of petroleum reservoir fluids. In the area of phase behavior modeling, Dr. Okuno has produced a number of important contributions, such as efficient and robust algorithms for multiphase equilibrium computation and reliable methods of reservoir fluid characterization using an equation of state. They are well recognized and accepted as significant contributions to numerical simulation techniques for enhanced oil recovery. For example, Kumar and Okuno (2016) presented the first systematic method of multiphase fluid characterization using an equation of state for solvent injection processes. Using the Peng-Robinson equation of state, Dr. Okuno and his student developed a new set of binary interaction parameters (BIPs) for solvent components with heavy hydrocarbon fractions, in which three-hydrocarbon-phase equilibrium data were used for each binary. This is a novel way to estimate binary interaction parameters, and it turned out to be the correct way to predict miscible conditions between injection gas and reservoir oil as shown for 90 reservoir fluid cases.

In Okuno et al. (2017), Dr. Okuno presented a breakthrough paper on a new algorithm for multiphase equilibrium calculations. Isothermal isobaric multiphase equilibrium was formulated such that the algorithm globally searches for a more stable equilibrium solution. The algorithm can solve for complex phase equilibria even without any initial guess for expected equilibrium phases. This algorithm resolves many challenging problems in phase behavior computations for numerical reservoir simulation. This algorithm has been also applied to complicated isenthalpic flash calculations (Zhu and Okuno 2016).

His recent and very original research on experimental and computational phase behavior of solvent/oil/water mixtures and its impact on thermal oil recovery processes is instrumental to further development of efficient oil recovery methods. In Gao et al. (2017), Dr. Okuno

experimentally studied for the first time four coexisting phases for heavy-oil/butane/water mixtures. Dr. Okuno and his team are tackling various research questions that came out of this research. In one of his papers to be presented at the SPE annual technical conference this October, for example, he will present a novel application of a cubic-plus-association equation of state to represent complex interaction/association of water and asphaltene components. Also, his investigation into the effect of multiphase behavior on oil transport in porous media gave him various ideas about how to improve conventional oil recovery methods. Dr. Okuno recently filed a non-provisional patent application on a novel oil recovery method. Also, he is studying the application of alkaline solvents for enhanced oil recovery as one of his on-going research projects.

Dr. Okuno developed a petroleum fluid laboratory that is capable of high-temperature/high-pressure experiments for complex fluid systems. With the advanced laboratory capabilities, he and his research team currently work on development of new oil recovery methods using novel solvents. It should be noted that the experimental work and high temperature heavy oil thermodynamics is very different from his PhD work. Dr. Okuno has demonstrated his creativity and originality in research based on detailed knowledge of multiphase behavior and fluid flow.

PUBLICATION RECORD

Dr. Okuno has authored a total of 26 refereed journal publications and 29 conference proceedings. Of these he authored 22 journal publications and 24 conference proceedings while in rank at the University of Texas at Austin and the University of Alberta. These are presented and discussed in detail in his promotion package. In all of these publications Dr. Okuno has either been the first author or made significant contributions to the publication.

His Google citation number is 385 and h-index is 11. His refereed publications are in very well respected journals such as *SPE Journal* and *Fluid Phase Equilibria*. *SPE Journal* is the most reputed journal in petroleum engineering. It has an impact factor of 2.2 because the academic research community in petroleum engineering is small and Society of Petroleum Engineering has a very successful conference proceedings system. About 1 in 4 papers get accepted into SPE conferences of which about 1 in 3 get published in SPE journals. *Fluid Phase Equilibria* is the premier journal in fluid thermodynamics, even though it has an impact factor of 2.47. He has also published in the journal *Fuel* with an impact factor of 4.6.

He has published work that is both of fundamental importance in the thermodynamics of complex fluid mixtures as well as work that is of great practical significance. One example of his contribution to fundamental problems in the thermodynamics of multi-phase fluid mixtures is his work on isenthalpic flash calculations for multiphase water-hydrocarbon mixtures. His current work related to the application of CO₂ and hydrocarbon solvents to improved oil recovery has the potential to have a tremendous impact on oil recovery from unconventional reservoirs.

Dr. Okuno's fundamental contributions in phase behavior and thermodynamics have found wide applications in improved oil recovery and other aspects of oil and gas reservoir management. As Dr. Okuno develops his ideas further, they will find broad application in the field. He is already involved with several companies in applying many aspects of his research to real world engineering problems. He has established collaborations with several industry research labs in the US, Canada and Japan.

RESEARCH GRANTS

Dr. Okuno has been successful at raising research funds from a variety of funding sources. He is currently the PI in nine funded research projects. His funding in rank at UT Austin is \$442,845 (August 2015 – August 2017). Before joining UT-Austin, he received research funding of CAD 613,965 + USD 40,000 at University Alberta. He received two grants from NSERC (Canadian NSF) on fundamentals of high temperature thermodynamics and steam assisted gravity drainage of heavy oil. These are very impressive numbers for an assistant professor in any field of engineering or science. Perhaps what is even more impressive is that this funding has come at a time of low oil prices when it has been very difficult to raise money for research related to oil and gas during 2014-17. This bodes well for his long term success at maintaining an active and well-funded research program. An additional \$266,811 of industrial grants have been recently approved or committed by the sponsors but the funds have not yet been received (see the supplemental information for documentation). In summary, Dr. Okuno has a proven track record of successful research fundraising.

MENTORING OF GRADUATE STUDENTS

Dr. Okuno has been able to build up a healthy and active research group of graduate students and postdocs. He currently supervises six PhD students, one MS student and one post-doctoral fellow. Since he joined our faculty in 2015, he has not had sufficient time to graduate a PhD student at the University of Texas at Austin. One of his PhD students is expected to graduate within this academic year. However, while at the University of Alberta, he completed the supervision of two PhD and 7 MS students. One of his PhD students is now a full professor at the Indian School of Mines.

In addition, he supervises and co-supervises undergraduate research students and serves on several PhD dissertation committees. In addition to his theoretical and modeling research, Dr. Okuno is currently building an experimental facility to conduct high temperature/high pressure phase behavior experiments. This facility will provide state of the art research capabilities to conduct fundamental studies on fluid properties and phase behavior. Such equipment and capabilities are complex and are sorely lacking at other academic institutions. We expect that when this facility is fully operational it will help Dr. Okuno attract even more funding and attention from other research groups. This level of research activity ranks him as a highly productive faculty member as compared to others in our department as well as in our field nationwide.

EVIDENCE OF PEER RECOGNITION AND TECHNICAL LEADERSHIP

Dr. Okuno's deep involvement in research and his recognition and reputation among his peers are also reflected in his involvement as a reviewer for over 22 journals. He has served as the Associate Editor for the SPE Journal, as an Associate Editor for the Journal of Natural Gas Science & Engineering, and a Guest Editor for a Special Issue on “Advances in Unconventional Oil and Gas Resources.” Also, he is serving as a member of the Materials and Chemical Engineering Evaluation Group for Discovery Grants at the Natural Sciences and Engineering Research Council of Canada (NSERC). This is quite a prestigious position for an assistant professor, reflecting his consistent services to the community and peer recognition. His interaction with his colleagues within the technical and academic community in his field clearly demonstrate his leadership skills and his ability to collaborate with his colleagues in research. These connections and technical collaborations will help to cement his position as a leader in his research areas.

REFERENCE LETTERS

Eight reference letters evaluating Dr. Okuno's promotion dossier were received. Dr. Erling Stenby, Technical University of Denmark, declined to write a letter because of his summer vacation. Two other potential referees did not consider themselves able to evaluate his promotion dossier. Three international referees never responded to repeated requests.

Letters of reference for Dr. Okuno came from international experts in thermodynamics, phase behavior, fluid properties, enhanced oil recovery, reservoir engineering and reservoir simulation among other relevant areas. Two of the letters came from members of NAE. All referees understand the requirements for promotion to tenure at US universities. His academic colleagues hold him in very high regard as reflected in their letters. The following are extracts from their letters:

Dr. John Lee, NAE (Texas A&M) writes: *"...he is highly qualified for tenure and promotion to the rank of Associate Professor. ...His 2016 paper... is especially noteworthy because it was published in the [SPE's] most prestigious journal... Perhaps of more general and fundamental interest is Dr. Okuno's 2015 paper published in Chemical Engineering Science... Particularly striking is the fact that the methodology was successfully applied to 84 different reservoir fluids, including gas condensates, volatile oils, black oils, and heavy oils. Remarkable! ...he is ideally qualified to make progress in these frontier areas. ...Dr. Okuno's development at this stage of his career places him among the clear leaders among the younger scientists at research-intensive universities. ...his potential for future professional growth and leadership appears to be excellent. He would certainly be promotable at Texas A&M."*

Iraj Ershagi, NAE (USC, Mork Family Dept. of Chemical Engineering and Materials Science) writes: *"...I am aware of his creative contributions to the literature in the areas of phase behavior modeling as well as his outstanding technical editor services to the Society of Petroleum Engineers. His original research work at University of Alberta contributed to new understanding about recovery processes... He has been quite productive and generating great contributions to the literature... While at UT, his level of efforts in raising research funding and supervising research has been outstanding... The recognition he has received from SPE with the Junior Faculty Research Award is indicative of his originality and creative abilities. ...I am pleased to recommend his promotion..."*

Hamdi Tchelepi (Stanford University) writes *"...I first met Ryosuke Okuno at a scientific conference where he gave a talk about his PhD work... an impressive PhD body of work... Since then I have been keen to follow his research activities. ...In my opinion, the experimental and fluid characterization programs of solvent-hydrocarbon-water mixtures stand out without peer. That work has contributed substantially to our collective confidence in the simulation predictions of heavy-oil recovery processes. ...Ryosuke Okuno's scholarship contributions in the areas of phase behavior and thermal-compositional reservoir simulation are impressive. In my view, Prof. Okuno is the leading expert on modeling phase behavior and its coupling to the flow dynamics. ...[he] is a world-class expert... I would be happy to "compete" with your great department in order to attract Prof. Okuno to Stanford."*

Walter Chapman (Rice University, Dept. of Chemical and Biochemical Engineering) *"His research funding level appears good...I do not consider research funding to be a concern since, as the impact of his research continues to grow, he will find new research and funding opportunities. ... Dr. Okuno's production of published manuscripts is reasonable for a faculty*

member at this stage of his career. ... Dr. Okuno's publications are in quality journals and the research is of high quality. ... Based on the quality and depth of the research, I recommend promotion to associate professor with tenure."

Turgay Ertekin (Penn State University, John and Willie Leon Family Dept. of Energy and Mineral Eng.) writes: "...I am supporting Dr. Okuno's promotion to associate professor and tenure enthusiastically and with no reservation. ...Dr. Okuno's ...degrees...make him a multi-faceted scientist. ...I find the papers... thought provoking as they appeared in top-tier journals... Dr. Okuno has never "rested on his oars" as he continued to maintain high levels of effectiveness and productivity... His rather rich industrial and academic experiences, when coupled together, clearly indicate that Dr. Okuno's work is competent and admirably collaborative and forceful towards generating new questions and answers... pushing the limits of the knowledge envelope... Accordingly, I have no qualm in stating that Dr. Okuno, with no doubt, excelled in research. ...from the perspective of his research accomplishments [he] is a deserving candidate to be appointed as an associate professor as he would have been here at Penn State..."

Milind Deo (University of Utah, Chair of Department of Chemical Engineering) writes: "...Dr. Okuno has an impressive publication record. He has published in diverse journals... His work on phase behavior combined with mass transfer is particularly noteworthy and will have impact in developing better enhanced oil recovery processes... His funding record is reasonably good ... in a tough funding environment... ...opportunities at the US DOE are at historical lows and the reception for Petroleum Engineering related research at NSF has not been promising. Dr. Okuno has performed per expectations for a tenure-track assistant professor. ...his work is relevant and impactful in the area of phase behavior and enhanced oil recovery. ...I recommend that Dr. Okuno be granted tenure and be promoted..."

Robert Enick (University of Pittsburgh, Dept. of Chemical and Petroleum Engineering) writes "It is my pleasure to provide you with a very strong letter of recommendation ...for tenure and for advancement in rank... I was chair of our school's tenure committee for six years... Dr. Okuno is one of the few engineers who routinely tackles very difficult multi-phase problems... Because of the level of difficulty... there are few solid, meaningful, useful papers on this topic; I have found Dr. Okuno's work to be outstanding in this regard, particularly his 2010 paper... ...I have incorporated these findings into my CO2 EOR class at Pitt. ...[his] 2015 paper ...was an impressive and clever paper and will likely end up being one of his more impactful for modelers. ...Dr. Okuno certainly merits promotion. .. He has garnered a respectable and significant amount of funding... He has developed an impressive phase behavior and transport property lab. He has established himself as an expert... He has published ... in numerous well-written and highly detailed papers..."

Sanjay Srinivasan (Penn State University, Chair, John and Willie Leon Family Dept. of Energy and Mineral Eng.) writes: "One of the key contributions of Dr. Okuno and his co-authors is a methodology for multiphase-fluid characterization... The development of this procedure is of immense significance for modeling ... complex recovery processes such as steam-solvent co-injection to recover heavy oils and bitumens. ...Dr. Okuno's publication record is excellent... The number of publications that he has in rank and the quality of those publications would certainly place him in the upper echelon of faculty cases being considered for tenure at my current institution. ...Dr. Okuno ...has.... established himself as a leading researcher in the area of hydrocarbon thermodynamics. I see him evolving as a world-renowned scientist who combines

experimental and theoretical research to solve many of the significant scientific challenges confronting mankind. I therefore strongly support his case for tenure..."

CONCLUDING REMARKS

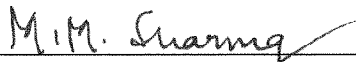
In summary Dr. Okuno has made significant contributions to the scientific literature in his field of phase behavior and thermodynamics. He has established an impressive and sustainable research program at UT. He has a very impressive publication record, a successful track record at fundraising, an active and productive research group and a stellar reputation among his engineering colleagues. He is widely recognized as a rising star who we expect will soon be recognized as a world leader in his research field. He has already made a big impact on his field with his exceptionally original and significant research publications in top scientific journals. All of the reference letters from distinguished faculty including two members of NAE recognize his outstanding research contributions and strongly endorse his promotion. Dr. Okuno's graduate student production is excellent. He is exceptionally well qualified to teach research methods and skills to the graduate research assistants that he supervises based on both his industrial and academic experience and his exceptional knowledge, intellect and skills.

The Budget Council Tenure and Promotion Committee has determined that Dr. Okuno's research record meets or exceeds expectations for promotion.

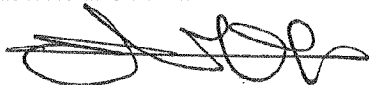


Kamy Sepelmoori, Chair

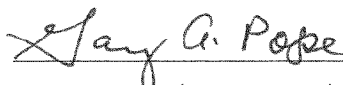
PGE Tenure and Promotion Committee



Mukul M. Sharma



Eric van Oort



Gary Pope, Ad Hoc Committee Member

Candidate's Five Significant Works (in chronological order)

Ryosuke Okuno, Ph.D., P.Eng.

1. **Gao, J.**, Okuno, R., and Li, H.A. An Experimental Study of Multiphase Behavior for n-Butane/Bitumen/Water Mixtures. *SPE Journal*. Volume 22, Issue 3, June 2017. <http://dx.doi.org/10.2118/180736-PA>
2. **Kumar, A.** and Okuno, R. A New Algorithm for Multiphase Fluid Characterization for Solvent Injection. *SPE Journal*. Volume 21, Issue 5, October 2016. <http://dx.doi.org/10.2118/175123-PA>
3. **Zhu, D.** and Okuno, R. Multiphase Isenthalpic Flash Integrated with Stability Analysis. *Fluid Phase Equilibria*. Volume 423, pp. 203-219, September 15, 2016. <http://dx.doi.org/10.1016/j.fluid.2016.04.005>
4. **Kumar, A.** and Okuno, R. Direct Perturbation of the Peng-Robinson Attraction and Covolume Parameters for Reservoir Fluid Characterization. *Chemical Engineering Science*. Volume 127, pp. 293-309, May 4, 2015. <http://dx.doi.org/10.1016/j.ces.2015.01.032>
5. Okuno, R. and **Xu, Z.** Mass Transfer on Multiphase Transitions in Low-Temperature Carbon-Dioxide Floods. *SPE Journal*. Volume 19, Number 6, pp. 1005-1023, December 2014. <http://dx.doi.org/10.2118/166345-PA>

Note that students' names are in bold text.

Candidate's Summary on Research

Ryosuke Okuno, Ph.D., P.Eng.

Table 1. Research summary

Metric	Value
Peer-reviewed journal publications (in rank and total)	22 / 26
Peer-reviewed conference proceedings (in rank and total)	24 / 29
Number of journal papers in rank with supervised student(s) from UT as co-author	19 (UA) / 2 (UT)
Total citations of all publications (career) from ISI Web of Science	106
h-index (career) from ISI Web of Science	6
Total citations of all publications (career) from Google Scholar or Publish or Perish	382
h-index (career) from Google Scholar or Publish or Perish	11
Total external research funding raised in rank	USD 482,845 + CAD 613,965
Total external research funding raised in rank (candidate's share)	USD 482,845 + CAD 613,965
Total number of external grants/contracts awarded in rank	9
Number of external grants/contracts awarded in rank as PI	7

Overview

The main subject of my research is to understand the interplay between subsurface flow and phase behavior for oil/gas recovery from conventional and unconventional reservoirs. Such theory is necessary to reliably design many reservoir processes, such as injection of gas, solvent, steam, and surfactant. I have developed a strong research program to address fundamental and practical research problems that require the compositional framework of petroleum reservoir engineering, in which thermodynamics plays an important role. I use this compositional reservoir engineering framework to understand multicomponent multiphase flow in porous media and to develop novel methods for oil/gas recovery. In particular, my unique contributions in this area are rapidly growing for thermal enhanced oil recovery (EOR) (e.g., Keshavarz et al. 2015, Venkatramani and Okuno 2017).

I am a petroleum engineer, and a registered Professional Engineer (Alberta, Canada) with 6 years and 10 months of industrial experience (2000-2006 and 2009-2010) in addition to a Ph.D. degree in petroleum engineering. The applicability of the compositional approach to a wide range of fundamental and practical engineering problems has fascinated me through my professional and academic career since April, 2000.

As part of my Ph.D. at the University of Texas at Austin (UT Austin), I developed new algorithms for multiphase equilibria using a cubic equation of state (EOS), and implemented them in UTCOMP (Okuno et al. 2010abc). UTCOMP is a multiphase compositional reservoir simulator originally developed at UT Austin in 1990, and since then it has been one of the most advanced compositional reservoir simulators in the world. The updated UTCOMP with my algorithms enabled me to investigate detailed mechanisms of oil displacement by solvent with complex multiphase behavior (Okuno et al. 2011). The research experience during my Ph.D. studies also gave me an analytical understanding of multicomponent multiphase flow for reservoir engineering.

One of the research abilities unique to me is the utilization of compositional phase behavior when they are coupled with multiphase flow for enhanced oil recovery (EOR). An important contribution in this area is the novel generalization of gas injection theory for three-hydrocarbon-phase flow, where critical endpoints

play important roles in oil displacement (Okuno and Xu 2014ab). This research gave a novel framework to address several unanswered questions regarding three-hydrocarbon-phase flow that had been discussed for more than 25 years in the literature.

I was certain that my expertise would contribute directly to development of the emerging technology for bitumen recovery by steam-solvent coinjection. It was for this reason that I took my first faculty position in October 2010 at the University of Alberta, Canada, where the efficiency of heavy-oil/bitumen production is crucial to the country's economy. The research program I established there was to develop theory for combined miscible/thermal EOR.

Bitumen recovery by coinjection of steam and solvent is a complex process, where energy and mass balances in heterogeneous porous media are coupled with thermodynamics of both equilibrium and non-equilibrium. Such processes should be designed based on reliable representation of multiphase behavior for size-asymmetric mixtures including polar components, consisting of bitumen, water, and solvent, for a wide range of temperature (e.g., 300 – 520 K). The conventional cubic EOS may not be satisfactorily applicable for such mixtures, as we showed in experimental papers, Gao et al. (2017ab).

My first Ph.D. student, Dr. Ashutosh Kumar, studied characterization of oil/solvent mixtures by use of the Peng-Robinson EOS in a series of publications. In Kumar and Okuno (2015), for example, the novel method of reservoir fluid characterization directly adjusts the attraction and covolume parameters of components, unlike the conventional characterization methods. The most important feature of the method is that it can control phase behavior predictions monotonically and systematically in pressure-temperature-composition space. In a more recent paper (Kumar and Okuno, 2016), we presented the first systematic method of multiphase fluid characterization for up to three hydrocarbon phases. These characterization methods were carefully tested for phase behavior data for more than 90 different reservoir fluids.

Robust and efficient solution for phase behavior is crucial for EOS-based compositional reservoir simulation. In simulation of steam-solvent coinjection for bitumen recovery, phase behavior solution can be much more difficult since mass-balance, energy-balance, and phase behavior equations are all coupled. We studied multiphase behavior calculation for isenthalpic flash, for which the total enthalpy and pressure are specified for a given overall composition. This type of flash calculations has been known to be important, but difficult for steam-injection simulation. In Zhu and Okuno (2016), the main difficulty associated with phase transitions in steam injection problems was identified. We then proposed a way to improve the problem by conducting phase-split and phase-stability calculations simultaneously in an integrated manner. The algorithm has been further improved since the publication, and the most updated algorithm for isothermal flash was recently accepted for publication in *SPE Journal* (Okuno et al. 2017).

I was rapid to demonstrate an ability to acquire funding for my heavy-oil/bitumen research. Proposals made on this subject during my tenure at the University of Alberta until August 2015 yielded five external research grants (totaling CAD 613,965 plus USD 40,000), on all of which I was the sole PI (No. 5 – 9 in Table 2). For one of them, I was a 2012 awardee for the highly competitive SPE Petroleum Engineering Junior Faculty Research Initiation Award. I produced 2 Ph.D. and 7 MSc graduates in petroleum engineering from the University of Alberta (2 MSc were co-supervised). The first Ph.D. graduate under my sole supervision, Dr. Ashutosh Kumar, is currently a full professor at the Indian Institute of Technology (Indian School of Mines), Dhanbad. Ashutosh and I made two pieces of software for reservoir fluid characterization using an equation of state on the basis of our publications.

My move from the University of Alberta to UT Austin in August 2015 resulted in termination of all the contracts and several research projects held at Alberta (no research funds and/or equipment can cross the border). Furthermore, it was unfortunate that the transition to UT Austin was right after a substantial downturn in the petroleum industry, which started in November 2014. Nevertheless, it was a good

opportunity for me to widen my research areas and build the experimental capability of my research group. At UT Austin, I continue to work on the research program on heavy oil/bitumen, for which I have received USD 115,878 + USD 76,967 from two companies as the sole PI thus far (No. 1 and 2 in Table 2). Also, I am actively working to raise funding, build laboratory capabilities, and train students for a breadth of reservoir engineering problems, such as gas injection, low-salinity water injection, new solvents for EOR, chemical EOR, tight-oil recovery, phase behavior in small pores, and numerical reservoir simulator development.

I have three proposals approved for funding (totaling USD 289,251), awaiting for finalization of a research contract or grant installment (Table 3). Notifications of their approval have been attached to my tenure promotion package. For one of them, I won competitive research funding on a new EOR method as the PI from Saudi Aramco (USD 199,000 with Dr. Larry W. Lake as the co-PI). I presented my research proposal at their conference held in Abu Dhabi as one of the 29 competitors invited after Saudi Aramco's initial selection of proposals. The invited competitors included those from research intensive universities, such as UT Austin (other research groups), Rice University, Imperial College, Colorado School of Mines, and the University of Alberta (to list a few), and industrial research institutes. My successful proposal was accepted through a dynamic discussion process with Saudi Aramco's technical team during and after the presentation. This demonstrated my ability to integrate their technical concerns and needs with my expertise into an academic research project.

I am currently working to develop two industrial affiliate programs (IAPs): one on ethane-based EOR, and the other on improved recovery of tight oil. One of my journal publications on the former subject (McGuire et al., 2016) was featured in *The American Oil & Gas Reporter* as the February 2017 Cover Story. We held the first public meeting for the Ethane EOR IAP at UT Austin on June 1, 2017 with me as the PI and Dr. Larry W. Lake and Dr. Kishore K. Mohanty as the co-PIs. The meeting was attended by 42 people (in person and on line) from the 26 companies registered for the meeting. We are in collaboration with International Reservoir Technologies (IRT), a consulting company based in Colorado, for this potential IAP. Research and experiments would be conducted by us at UT Austin, and mechanistic reservoir simulations would be performed by IRT.

For research on tight-oil recovery, I believe that it is crucial to integrate two areas of expertise, reservoir engineering (including EOR) and horizontal-drilling/hydraulic-fracturing technologies. For this purpose, I am collaborating with Dr. Mukul M. Sharma for initiating the tight-oil IAP. We together submitted a prefatory proposal on this to the industrial research chair program of Foundation CMG in January 2017. Foundation CMG is based in Calgary, Canada, and it is a not-for-profit organization that supports research & development and students through research grants at universities. Since November 2014 (when I was at the Univ. of Alberta), I have been in contact with Foundation CMG as a top candidate for their research chair program. Currently, there are 13 research chairs around the world under Foundation CMG. Although the current downturn in the petroleum economy has delayed their process, they have informed that we are top-ranked in the current chair candidates. There have not been any federal opportunities in my research area and its vicinity since I came to UT Austin, and that is why I am currently working exclusively on industry proposals.

Table 2. Grants and contracts awarded while in rank

PI Role	Co-investigators	Agency	Grand Total	Okuno's Share	Grant Period	Institution
1 "Enhanced Oil Recovery"						
PI	None	Japan Petroleum Exploration	\$115,878	\$115,878	09/01/15-8/31/17	UT Austin
2 "Bitumen Recovery"						
PI	None	Japan Canada Oil Sands	\$76,967	\$76,967	09/01/15-06/30/17	UT Austin
3 "Minimum Miscibility Estimation for Multiphase Oil Displacement by Solvent"*						
PI	None	Gas Enhanced Oil Recovery JIP – Various Donors (K.K. Mohanty, PI)	\$100,000	\$100,000	09/01/15-08/31/17	UT Austin
4 "Alkaline Solvent for SAGD and CSS"*						
PI	None	Chemical Enhanced Oil Recovery JIP – Various Donors (G.A. Pope, PI)	\$150,000	\$150,000	06/01/16-05/31/18	UT Austin
5 "Infrastructure for Phase Behavior Studies at High Temperature-Pressure Conditions"						
PI	None	Canada Foundation for Innovation	C\$149,745	C\$149,745	04/01/15-08/31/15	Univ. of Alberta
6 "Thermodynamic Modeling of Water/Hydrocarbon Mixtures for Thermal Oil Recovery Simulation"						
PI	None	Natural Science and Engineering Research Council of Canada (NSERC)	C\$140,750	C\$140,750	09/01/14-08/31/15	Univ. of Alberta
7 "Modeling of Heavy-Oil Displacement Using the Solvent-Rich Liquid Phase in Solvent SAGD"						
PI	None	Japan Petroleum Exploration	C\$203,470	C\$203,470	09/01/12-08/31/15	Univ. of Alberta
8 "Modeling of Multiphase Behavior using an EOS for Solvent-SAGD Simulation"						
PI	None	Society of Petroleum Engineers	\$40,000	\$40,000	09/01/12-08/31/14	Univ. of Alberta
9 "Numerical Modeling for Improved Steam-Assisted Gravity Drainage"						
PI	None	Natural Science and Engineering Research Council of Canada (NSERC)	C\$120,000	C\$120,000	04/01/12-08/31/15	Univ. of Alberta
		Subtotal Okuno's share		US\$482,845 + C\$ 613,965		

* These grants were awarded to me out of the larger JIP projects run by Dr. Kishore Mohanty (No. 3) and Dr. Gary Pope (No. 4). I gave research presentations to their annual meetings, and the proposals were evaluated and approved by the JIP members and PI's.

Table 3. Forthcoming grants and contracts

PI Role	Co-investigators	Agency	Grand Total	Okuno's Share	Grant Period	Status
1 "Solvent-Assisted Smart Water Flooding for High-Temperature/High-Salinity Carbonate Reservoirs"						
PI	Co-PI Lake, L.W.	Saudi Aramco	\$199,000	\$187,780	09/01/17-08/31/18	Contract being finalized
2 "Fluid Characterization for CO ₂ Flooding"						
PI	None	JX Nippon Oil & Gas Exploration	\$10,251	\$10,251	09/01/17-08/31/18	Contract being finalized
3 "PVT Laboratory Study"						
PI	Co-PI Lake, L.W.	Occidental Petroleum	\$80,000	\$68,780	09/01/17-03/31/18	Awaiting for installment
Subtotal Okuno's share			\$289,251	\$266,811		

Publications

I have published 22 papers in rank (20 published and 2 accepted) in 8 different journals, out of which 11 papers are in *SPE Journal*. *SPE Journal* has been the most reputable journal in petroleum engineering for fundamental research papers for years. I published 11 papers in rank (15 in total) in this Journal because the majority of my publications are concerned with fundamentals of petroleum engineering. Also, many of my papers were presented first at SPE conferences, and then enhanced/submitted for journal publications. SPE conferences have a "no paper, no podium" policy. It is the most natural process to submit an enhanced version of the conference paper to one of SPE journals, such as *SPE Journal* and *SPE Reservoir Evaluation & Engineering*. Although journals under SPE usually have impact factors below 2.0, their actual impact in the petroleum industry is crucial for dissemination of our knowledge and industrial research funding.

Out of the 22 papers, I am the corresponding author for 20 papers (also the first author for 3 of them), and am the sole supervisor for 15 papers. The first Ph.D. student under my sole supervision, Dr. Ashutosh Kumar, produced 6 journal publications in 5 different journals with the total impact factor of 16.73. My first MS student (Mohsen Keshavarz) co-supervised with Dr. Tayfun Babadagli published 3 journal papers in 3 different journals with the total impact factor of 8.24. I am the corresponding author for all papers with Mohsen. These are some examples to demonstrate the training in my research group.

Vision

I would categorize my research into two main areas: 1) phase behavior, and 2) enhanced oil recovery (EOR). Since phase behavior is one of the most fundamental subjects in petroleum engineering, it was part of my long-term plan to study several topics of phase behavior with the first group of my students. This is why the majority of the publications made so far are in the area of phase behavior. The ongoing projects in my group at UT Austin are around the intersection of the two areas, concerned with the utilization of phase behavior for EOR. Also, I see my future publications more balanced between experimental and modeling research.

My vision as a researcher at UT Austin is twofold. Firstly, I will continue to develop new knowledge of petroleum phase behavior, with the immediate focuses on heavy-oil/bitumen and on unconventional resources, such as tight oil and shale gas. Secondly, I will develop novel methods of oil/gas recovery by

use of new EOR injectants, and/or by hybrid mechanisms, such as thermal/miscible EOR and chemical/miscible EOR.

My lab at UT Austin is equipped with high-temperature/high-pressure equipment for phase behavior/EOR studies, such as a PVT cell, core-flooding systems, gas chromatograph, permanent gas analyzer, viscometer, densitometer, slim-tube, mixing cells, pumps, and ovens. The lab became fully functional during the spring of 2017, because some pieces of equipment required renovations of the lab. Now, several students are conducting experimental research for solvent-based methods for bitumen recovery. They started producing high-quality data, some of which will be presented at the SPE Annual Technical Conference in October, 2017. I aim to enhance the lab capabilities of high-temperature high-pressure experiments for phase behavior and EOR. The immediate focuses are on two types of unconventional resources, tight oil and heavy oil, both of which are extremely difficult to recover without using phase behavior mechanisms.

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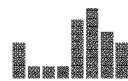
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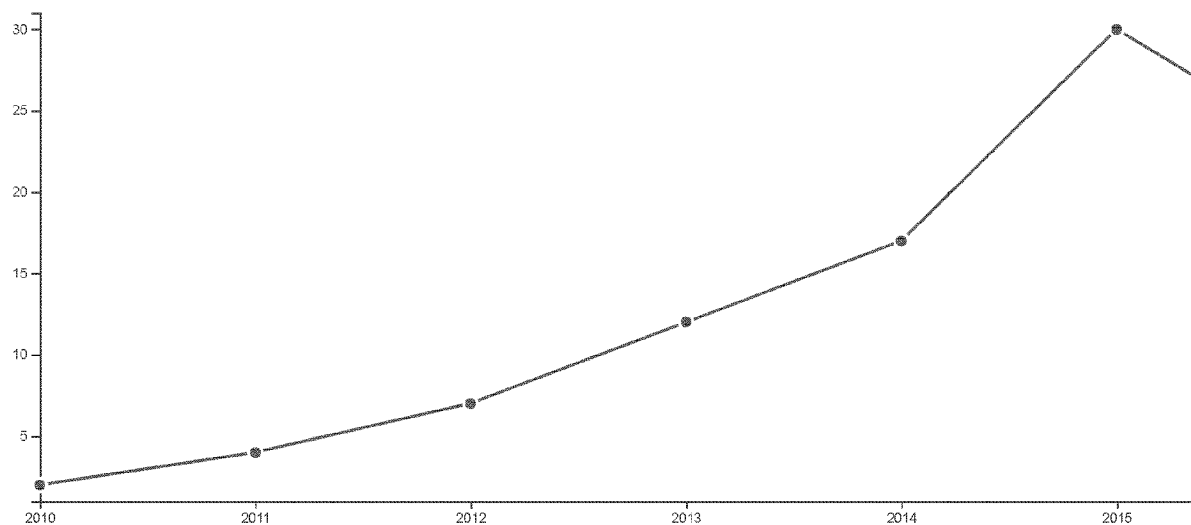
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| <input type="checkbox"/> | 4. Critical parameters optimized for accurate phase behavior modeling for heavy n-alkanes up to C-100 using the Peng-Robinson equation of state | 3 | 2 | 2 | 3 | 0 | 11 | 1.83 |
| | By: Kumar, Ashutosh; Okuno, Ryosuke
FLUID PHASE EQUILIBRIA Volume: 335 Pages: 46-59 Published: DEC 15 2012 | | | | | | | |
| <input type="checkbox"/> | 5. Mechanisms for High Displacement Efficiency of Low-Temperature CO2 Floods | 4 | 1 | 1 | 0 | 0 | 9 | 1.29 |
| | By: Okuno, R.; Johns, R. T.; Sepehrnoori, K.
SPE JOURNAL Volume: 16 Issue: 4 Pages: 751-767 Published: DEC 2011 | | | | | | | |
| <input type="checkbox"/> | 6. Characterization of reservoir fluids using an EOS based on perturbation from n-alkanes | 3 | 3 | 1 | 1 | 0 | 8 | 1.60 |
| | By: Kumar, Ashutosh; Okuno, Ryosuke
FLUID PHASE EQUILIBRIA Volume: 358 Pages: 250-271 Published: NOV 25 2013 | | | | | | | |
| <input type="checkbox"/> | 7. Efficient oil displacement near the chamber edge in ES-SAGD | 0 | 4 | 0 | 3 | 0 | 7 | 1.75 |
| | By: Keshavarz, M.; Okuno, R.; Babadagli, T.
JOURNAL OF PETROLEUM SCIENCE AND ENGINEERING Volume: 118 Pages: 99-113 Published: JUN 2014 | | | | | | | |
| <input type="checkbox"/> | 8. Direct perturbation of the Peng-Robinson attraction and covolume parameters for reservoir fluid characterization | 0 | 0 | 2 | 2 | 0 | 4 | 1.33 |
| | By: Kumar, Ashutosh; Okuno, Ryosuke
CHEMICAL ENGINEERING SCIENCE Volume: 127 Pages: 293-309 Published: MAY 4 2015 | | | | | | | |
| <input type="checkbox"/> | 9. Optimal Application Conditions for Steam/Solvent Coinjection | 0 | 1 | 1 | 1 | 0 | 3 | 1.00 |
| | By: Keshavarz, Mohsen; Okuno, Ryosuke; Babadagli, Tayfun
SPE RESERVOIR EVALUATION & ENGINEERING Volume: 18 Issue: 1 Pages: 20-38 Published: FEB 2015 | | | | | | | |
| <input type="checkbox"/> | 10. A robust algorithm for isenthalpic flash of narrow-boiling fluids | 0 | 1 | 1 | 1 | 0 | 3 | 0.75 |
| | By: Zhu, Di; Okuno, Ryosuke
FLUID PHASE EQUILIBRIA Volume: 379 Pages: 26-51 Published: OCT 15 2014 | | | | | | | |

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Ryosuke Okuno

Assistant Professor of Petroleum Engineering,
University of Texas at Austin
Petroleum Engineering, Enhanced Oil Recovery,
Heavy Oil Recovery, Phase Behavior, Reservoir

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Simulation

Title 1–20

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Three-phase flash in compositional simulation using a reduced method

R Okuno, RT Johns, K Sepehrnoori

SPE Journal 15 (03), 689-703

41 2010

Optimal application conditions for steam/solvent coinjection

M Keshavarz, R Okuno, T Babadagli

SPE Reservoir Evaluation & Engineering 18 (01), 20-38

39 2015

Application of a reduced method in compositional simulation

R Okuno, RT Johns, K Sepehrnoori

SPE Journal 15 (01), 39-49

36 2010

Modeling of multiphase behavior for gas flooding simulation

R Okuno

The University of Texas at Austin

36 2009

A new algorithm for rachford-rice for multiphase compositional simulation

R Okuno, R Johns, K Sepehrnoori

SPE Journal 15 (02), 313-325

33 2010

Mechanisms for high displacement efficiency of low-temperature CO₂ floods

R Okuno, RT Johns, K Sepehrnoori

SPE Journal 16 (04), 751-767

22 2011

Efficient oil displacement near the chamber edge in ES-SAGD

M Keshavarz, R Okuno, T Babadagli

Journal of Petroleum Science and Engineering 118, 99-113

20 2014

Critical parameters optimized for accurate phase behavior modeling for heavy n-alkanes up to C 100 using the Peng–Robinson equation of state

A Kumar, R Okuno

Fluid Phase Equilibria 335, 46-59

20 2012

Characterization of reservoir fluids using an EOS based on perturbation from n-alkanes

A Kumar, R Okuno

Fluid Phase Equilibria 358, 250-271

16 2013

A semi-analytical solution to optimize single-component solvent coinjection with steam during SAGD

M Keshavarz, R Okuno, T Babadagli

Fuel 144, 400-414

15 2015

Efficient displacement of heavy oil by use of three hydrocarbon phases

R Okuno, Z Xu

SPE Journal 19 (05), 956-973

12 2014

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Ryosuke Okuno - Google Scholar Citations

Title	1–20	Cited by	Year
Characterization of water-containing reservoir oil using an EOS for steam injection processes AV Venkatramani, R Okuno Journal of Natural Gas Science and Engineering 26, 1091-1106		9	2015
Direct perturbation of the Peng–Robinson attraction and covolume parameters for reservoir fluid characterization A Kumar, R Okuno Chemical Engineering Science 127, 293-309		8	2015
A robust algorithm for isenthalpic flash of narrow-boiling fluids D Zhu, R Okuno Fluid Phase Equilibria 379, 26-51		8	2014
Fluid characterization using an EOS for compositional simulation of enhanced heavy-oil recovery A Kumar, R Okuno SPE Annual Technical Conference and Exhibition		6	2012
An Experimental Study of Multiphase Behavior for n-Butane/Bitumen/Water Mixtures J Gao, R Okuno, HA Li SPE Journal		5	2016
A New Algorithm for Multiphase-Fluid Characterization for Solvent Injection A Kumar, R Okuno SPE Journal 21 (05), 1,688-1,704		5	2016
Mass Transfer on Multiphase Transitions in Low-Temperature Carbon Dioxide Floods R Okuno, Z Xu SPE Journal 19 (06), 1,005-1,023		5	2014
Robust Isenthalpic Flash for Multiphase Water/Hydrocarbon Mixtures D Zhu, R Okuno SPE Journal 20 (06), 1,350-1,365		4	2015
Reservoir Oil Characterization for Compositional Simulation of Solvent Injection Processes A Kumar, R Okuno Industrial & Engineering Chemistry Research 53 (1), 440-455		4	2013

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**PGE Budget Council Statement
For
Ryosuke Okuno, Ph.D.**

Academic Advising, Counseling, and Other Student Services

Advising Undergraduate Students

Dr. Okuno advised two undergraduate students at the University of Alberta and one at UT Austin as listed below.

1. Schmidt, Karl, "Effects of Binary Interaction Parameters on the Gibbs Free Energy of Multicomponent, Multiphase Fluids," Summer Undergraduate Research Internship at The University of Texas at Austin, May 31, 2016 – August 5, 2016.
2. Feng, Guan Xiong, "Systematic Investigation of the Effect of Oil Properties on the Minimum Miscibility Pressure," Research for an Undergraduate Student Research Award of NSERC at the University of Alberta, 2014.
3. Guo, Tao, "Enhanced Heavy Oil Recovery Using Vapor Extraction," Research for Dean's Research Award at Univ. of Alberta, 2011.

They all worked on short-term research projects.

Dr. Okuno has participated as a Society of Petroleum SPE student advisor at the U. of Alberta and has served as undergraduate research advisor for 3 students (above), also at UA, and has two that are continuing. He worked with high-school students in the 2012 PetroChallenge. He also has been an advisor in the PGE Department's Summer Research Institute. SURI is a UT PGE program to attract qualified graduate students by hiring them to work with UT professors for 10 weeks in the summer.

Advising Graduate Students

Dr. Okuno's 5 PhD and 7 MS graduates listed below are all from the University of Alberta. He continued to supervise all remaining students after coming to UT, except for one who changed supervisors after Dr. Okuno's resignation from the UA.

Degrees Conferred to Graduate Students Supervised

Student Name	Co-Supervisor	Degree	Start Date	Graduation Date	Placement
Arun Venkat Venkatramani	-	PhD	09/2014	08/2017	Just graduated
Ashutosh Kumar	-	PhD	09/2011	12/2015	Professor at Indian Institute of Technology, Dhanbad, India

Xiaoxing Shi	-	MS	09/2014	12/2016	Just graduated
Jianyi Gao	Huazhou Li	MS	09/2014	12/2016	China National Offshore Oil Corporation
Kai Sheng	-	MS	09/2014	08/2016	PhD (UT Austin, PGE)
Zhongguo Xu	-	MS	09/2012	01/2016	Unknown
Arun Venkat Venkatramani	-	MS	09/2012	08/2014	Just finished his PhD from Univ. of Alberta
Bo Zhang	-	MS	01/2012	04/2014	PhD (Univ. of Alberta)
Mohsen Keshavarz	Tayfun Babadagli	MS	09/2011	06/2013	Suncor Energy

Dr. Ashutosh Kumar produced 6 journal publications in 5 different journals with a total impact factor of 16.73. Dr. Kumar is now a full professor at the Indian Institute of Technology (Indian School of Mines), Dhanbad in his home country. A full professor position was offered to him because of his 10 years of industrial experience, in addition to his UA publications. Dr. Kumar, wrote in his dissertation, "I learned the essence of research and the art of presentation and communication from him (Dr. Okuno)."

Dr. Okuno's first MS student, Mr. Mohsen Keshavarz, co-supervised with Dr. Tayfun Babadagli, graduated in 1 year and 9 months, and published 3 journal papers in 3 different journals with the total impact factor of 8.24. Mr. Keshavarz wrote in this MS thesis, "He (Dr. Okuno) has always been accessible and willing to help me with my research."

The most recent MS graduate, Ms. Xiaoxing Shi, wrote "I've learned a lot from him (Dr. Okuno) in terms of logical thinking and a rigorous attitude towards research, which will definitely benefit me throughout my life."

Dr. Arun Venkat Venkatramani completed his PhD in only 3 years. He accelerated his PhD program because he extended his research from one of his MS thesis. His PhD dissertation consists of 3 solid chapters, each of which has been published/accepted, or submitted to a peer-reviewed journal. Dr. Venkat Venkatramani, wrote, "I am very appreciative of his (Dr. Okuno's) efforts to teach me the importance of having a strong work ethic, thinking critically, and communicating effectively."

Summary of Current Graduate Students in the Pipeline at UT-Austin (as of 09/01/2017)

Student Name	Co-Supervisor	Degree	Date Reached Candidacy	Date Expected to Reach Candidacy	Expected Graduation Date
Di Zhu*	-	PhD	05/2017	-	12/2017
Kwang Hoon Baek	-	PhD	-	11/2017	05/2019
Sajjad Neshat	Gary A. Pope	PhD	-	11/2017	12/2019
Mingyuan Wang	-	PhD	-	05/2018	05/2020
Kai Sheng	-	PhD	-	05/2018	05/2020
Sofiane Achour	-	PhD	-	05/2019	05/2021
Jose Hernandez-Mejia	-	MS	-	-	08/2019

* Di Zhu completed her PhD candidacy exam at the University of Alberta on December 8, 2014, transferred to UT Austin in January 2016, and then had to retake three qualifying exams to meet UT's

requirements. She was admitted to PhD candidacy in May 2017. She has published three peer-reviewed papers.

Summary

The following table summarizes all of Dr. Okuno's advising:

Summary of Academic Advising

Metric	Value
Student organizations advised	2 (SPE student chapter at Univ. of Alberta, and local high school, Sherwood Park, AB, Canada)
Undergraduate researchers supervised	3
PhD students completed *	2 (2 sole advisor)
MS students completed *	6 (5 sole advisor)
PhD students in pipeline (as of 09/2017)*	5.5 (5 sole advisor)
MS students in pipeline (as of 09/2017)*	1 (1 sole advisor)

Notes:

- * Count student as 1.0 if candidate is the sole advisor, count student as 0.5 if the student is co-advised.

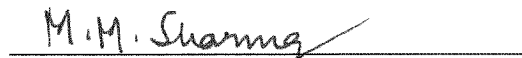
Dr. Okuno has frequent contacts with all of his students on all of his projects. One of his favorite sayings is that his student should not just "work hard, but think hard."

Concluding Remarks

The Budget Council Tenure and Promotion Committee has determined that Dr. Okuno meets or exceeds expectations for promotion with respect to student advising.



Kamy Sepehroori, Chair
PGE Tenure and Promotion Committee



Mukul M. Sharma



Eric van Oort

Candidate's Summary of Advising, Counseling, and Other Student Services

Ryosuke Okuno, Ph.D., P.Eng.

Table 1. Summary of Academic Advising

Metric	Value
Student organizations advised	2 (SPE student chapter at Univ. of Alberta, and local high school, Sherwood Park, AB, Canada)
Undergraduate researchers supervised	3
PhD students completed *	2 (2 sole advisor)
MS students completed *	6 (5 sole advisor)
PhD students in pipeline (as of 09/2017)*	5.5 (5 sole advisor)
MS students in pipeline (as of 09/2017)*	1 (1 sole advisor)

Notes:

* Count student as 1.0 if candidate is the sole advisor, count student as 0.5 if the student is co-advised.

Overview

I very much enjoy in-person communication with undergraduate and graduate students personally and professionally. Through a variety of professional experiences in the petroleum industry and at universities, I recognize that different people have different ways of thinking, learning, and interacting with his/her advisor. I respect students' ways of thinking, and adjust my advising accordingly for each student I interact with.

I never hesitate to spend time talking with students about their questions, their technical, professional, personal interests and concerns, and coursework toward their degree programs. Students will learn something from every single minute we spend with them. Since the initial meeting with my first graduate student, it has been my policy to spend at least one hour with each student for his/her weekly meeting. I try to be transparent in my advising; e.g., what I think is strong or weak in students' skills and knowledge, and the long-, mid-, and short-term goals in their degree programs.

The primary goal of my advising is that students become responsible practical or research engineers who can solve new engineering problems needed by the petroleum industry, and recognize the limitations of their approach. The education that I provide as a professor should be of long-lasting value because of a wide variety of technical challenges faced by the industry. To achieve this goal, I not only teach engineering knowledge through research publications, but also help students develop solid procedures on conducting research and in the solution of engineering problems.

I served as faculty advisor for several events held by student organizations. At the University of Alberta, I assisted the SPE student chapter for their booth at college-wide events. I also interacted with high-school students in the educational event, the 2012 PetroChallenge (<http://www.nexttraining.net/resources/PetroChallenge.aspx>).

Advising graduate students

It is extremely important for students to learn how to think and solve problems in a systematic way by logic. Critical thinking is one the most practical skills that I try to teach every student I interact with.

The first PhD student under my supervision, Dr. Ashutosh Kumar, wrote in his dissertation, “I learned the essence of research and the art of presentation and communication from him.” Likewise, my second PhD graduate, Dr. Arun Venkat Venkatramani, wrote, “I am very appreciative of his efforts to teach me the importance of having a strong work ethic, thinking critically, and communicating effectively.” I never asked Arun to “work” hard, but did tell him to think hard.

My first MS student, Mr. Mohsen Keshavarz, wrote in this MS thesis, “He has always been accessible and willing to help me with my research.” The most recent MS graduate, Ms. Xiaoxing Shi, wrote “I’ve learned a lot from him in terms of logical thinking and a rigorous attitude towards research, which will definitely benefit me throughout my life.” I tell students, especially graduate students, to make sure “it logically makes sense” (or to be skeptical). My students have taught me a lot of new knowledge. I learned from them by asking a lot of questions during weekly meetings.

Table 2. Degrees Conferred to Graduate Students Supervised

Student Name	Co-Supervisor	Degree	Start Date	Graduation Date	Placement
Arun Venkat Venkatramani	-	PhD	09/2014	08/2017	Just graduated
Ashutosh Kumar	-	PhD	09/2011	12/2015	Professor at Indian Institute of Technology, Dhanbad, India
Xiaoxing Shi	-	MS	09/2014	12/2016	Just graduated
Jianyi Gao	Huazhou Li	MS	09/2014	12/2016	China National Offshore Oil Corporation
Kai Sheng	-	MS	09/2014	08/2016	PhD (UT Austin, PGE)
Zhongguo Xu	-	MS	09/2012	01/2016	Unknown
Arun Venkat Venkatramani	-	MS	09/2012	08/2014	Just finished his PhD from Univ. of Alberta
Bo Zhang	-	MS	01/2012	04/2014	PhD (Univ. of Alberta)
Mohsen Keshavarz	Tayfun Babadagli	MS	09/2011	06/2013	Suncor Energy

The 5 PhD and 7 MS graduates listed in Table 2 are all from the University of Alberta. Although I moved to UT Austin in August 2015, I continued to supervise all remaining students, except for one. The last student, Dr. Arun Venkat Venkatramani, graduated in August 2017. The listed students were solely supported by the funding that I left at Alberta. I am the corresponding author for all papers with the students listed in Table 2. When I resigned from the University of Alberta, it was difficult to find other professors who could take over the projects for these students because none of the professors were close to my expertise. Only one student switched to another professor after I resigned from the University of Alberta.

The first Ph.D. student under my supervision, Dr. Ashutosh Kumar, produced 6 journal publications in 5 different journals with the total impact factor of 16.73. Right after his graduation, Ashutosh accepted a full professor position at the Indian Institute of Technology (Indian School of Mines), Dhanbad in his home country. A full professor position was offered to him likely because he had several other journal publications from his MS years and 10 years of industrial experience, besides his performance during the interview with them.

My first MS student, Mr. Mohsen Keshavarz, was co-supervised with Dr. Tayfun Babadagli. He graduated in 1 year and 9 months, and published 3 journal papers in 3 different journals with the total impact factor of 8.24. These are some examples to demonstrate the training in my research group.

Mr. Zhongguo Xu took 3 years and 4 months for his MS degree. He started as a PhD student, but did not pass the PhD candidacy exam. Then, he graduated with a MS degree. Dr. Arun Venkat Venkatramani took only 3 years for his PhD. This is mainly because he earned his 2nd MS degree under my supervision at the University of Alberta (his first MS degree is from Arizona State Univ. in Chemical Engineering). This accelerated his PhD program because he needed to take a small number of courses and because he extended his research from the MS thesis. Nevertheless, his PhD dissertation consists of 3 solid chapters, each of which has been published/accepted, or submitted to a peer-reviewed journal.

**Table 3. Summary of Current Graduate Students in the Pipeline at UT-Austin
(as of 09/01/2017)**

Student Name	Co-Supervisor	Degree	Date Reached Candidacy	Date Expected to Reach Candidacy	Expected Graduation Date
Di Zhu*	-	PhD	05/2017	-	12/2017
Kwang Hoon Baek	-	PhD	-	11/2017	05/2019
Sajjad Neshat	Gary A. Pope	PhD	-	11/2017	12/2019
Mingyuan Wang	-	PhD	-	05/2018	05/2020
Kai Sheng	-	PhD	-	05/2018	05/2020
Sofiane Achour	-	PhD	-	05/2019	05/2021
Jose Hernandez-Mejia	-	MS	-	-	08/2019

* Di Zhu completed her PhD candidacy exam at the University of Alberta on December 8, 2014. However, she transferred to UT Austin in January 2016, and then she had to retake three qualifying exams. She reached the PhD candidacy in May 2017. She has published three peer-reviewed papers under my supervision so far.

Advising undergraduate students

I supervised two undergraduate students at the University of Alberta and one at UT Austin as listed below. They all worked for short-term research projects. I enjoyed advising these young engineers, and witnessing their bright ideas being generated near the project's conclusion. I plan to work with more undergraduate students once we enhance the lab capabilities in the near future.

1. Schmidt, Karl, "Effects of Binary Interaction Parameters on the Gibbs Free Energy of Multicomponent, Multiphase Fluids", Summer Undergraduate Research Internship at The University of Texas at Austin, May 31, 2016 – August 5, 2016.
2. Feng, GuanXiong, "Systematic Investigation of the Effect of Oil Properties on the Minimum Miscibility Pressure," Research for an Undergraduate Student Research Award of NSERC at the University of Alberta, 2014.
3. Guo, Tao, "Enhanced Heavy Oil Recovery Using Vapor Extraction," Research for Dean's Research Award at Univ. of Alberta, 2011.

**PGE Budget Council Statement
For
Ryosuke Okuno, Ph.D.**

Service to the University and to the Nation, State and Community

Dr. Ryosuke Okuno has compiled an impressive record of service, some at the University of Alberta before coming to the University of Texas in 2015, and the remainder at UT.

Service to Nation, State and Community

Dr. Okuno has been a very active reviewer in petroleum engineering, mainly in the areas of petroleum phase behavior, enhanced oil recovery, heavy-oil/bitumen recovery, and compositional reservoir simulation. He served as an associate editor for the Journal of Natural Science and Engineering 2014 – 2017, and has been an associate editor for SPE Journal since 2016. He has received awards for service in both journals:

- Technical Editor Award, SPE Reservoir Evaluation & Engineering, SPE, September 2016
- Technical Editor Award, SPE Reservoir Evaluation & Engineering, SPE, September 2015
- Excellence in Peer Review, Journal of Natural Gas Science & Engineering, Elsevier, June 2014.

Performing reviewing services for the Society of Petroleum Engineers and other such journals is a significant contribution that can be very time-consuming and highly important to the profession. The SPE is an international professional society with more than 180,000 members. The SPE is the pre-eminent professional society in petroleum engineering.

- Dr. Okuno's service to the Natural Sciences and Engineering Research Council of Canada (NSERC) involves a great deal of time and a broad expertise. This service is equivalent to serving on review panels for the National Science Foundation in the US. The position is important in that it reviews grant applications (approximately 200 per year) submitted by professors at Canadian universities. NSERC places emphasis on finding highly qualified individuals to act as Evaluation Group members. This service involves thorough assessment of applications in Ottawa using a whole week in February, for which NSERC covers all travel and living expenses.
- Reviewing proposals for the American Chemical Society Petroleum Research Fund is another mark of high selectivity. These proposals are highly competitive; their funding rate varies from year to year at around 25%.
- Dr. Okuno also served as Examiner for "Secondary and Enhanced Oil Recovery" for National Exams for Professional Engineers Ontario, 2012 – 2014.

Being asked to do so much professional reviewing is an indication of the high regard accorded to Dr. Okuno's technical skills by his colleagues.

Service to the Petroleum and Geosystems Engineering (PGE) Department

Since coming to UT PGE, Dr. Okuno has served on the following committees:

Faculty Recruiting	2016 – present
Graduate Studies	2016 – present
Graduate Admissions	2015 – present.

He has also participated in the preparation and grading of the math qualifying exam for the last two years that he has been faculty member in our department.

Service on all three of the committees listed, Graduate Studies, Graduate Admissions, and Faculty Recruiting, can be time consuming. The Admissions committee must personally review more than 400 applications received by the department each year. Faculty Recruiting can be also time consuming depending on the amount of hiring done in a given year. For the 2016-2017 academic year, the committee reviewed about 60 applications, conducted about 10 Skype interviews, and recommended 4 candidates to the full PGE faculty. All services are of immense value to the Department.

Departmental Service at University Alberta

Dr. Okuno served on the following committees at the Civil and Environmental Engineering department at University of Alberta:

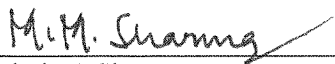
Petroleum Engineering Graduate Coordinator	2013 – 2015
External Affair	2010 – 2012.


The role as the petroleum engineering graduate coordinator included graduate admissions (PhD, MSc, and MEng), TA assignments, and graduate advising for the Petroleum Engineering program in the Department of Civil and Environmental Engineering. These roles are divided into separate committees at UT.

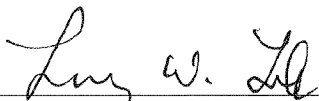
Concluding Remarks

The Budget Council Tenure and Promotion Committee has determined that Dr. Okuno's service record meets or exceeds expectations for promotion.


Kamy Sepahnoori, Chair
PGE Tenure and Promotion Committee


Mukul M. Sharma


Eric van Oort


Larry W. Lake, Ad hoc Committee Member

Candidate's Statement on Service to the University and to the Nation, State and Community

Ryosuke Okuno, Ph.D., P.Eng.

Service to the Petroleum and Geosystems Engineering (PGE) Department

Since coming to UT PGE, I have served as a member for the following committees:

Faculty Recruiting	2016 – present
Graduate Studies	2016 – present
Graduate Admissions	2015 – present.

I have also participated in the preparation and grading of the math qualifying exam.

Departmental Service at the University of Alberta

I served on the following committees at the Department of Civil and Environmental Engineering at the University of Alberta:

Petroleum Engineering Graduate Coordinator	2013 – 2015
External Affairs	2010 – 2012.

The roles as the petroleum engineering graduate coordinator included graduate admissions (PhD, MSc, and MEng), TA assignments, and graduate advising for the Petroleum Engineering program in the Department of Civil and Environmental Engineering.

I was also actively involved in several events to promote the petroleum engineering program at the University of Alberta, as follows:

- Faculty advisor for Elk Island PetroChallenge Student Event, December 18-19, 2012, Sherwood Park, Alberta, Canada.
- Faculty advisor, Engineering Expo, September 22, 2012, University of Alberta, Canada.
- Coordinator for the 1st Year Student Information Evening, March 12, 2012, University of Alberta, Canada.
- Faculty advisor, Engineering Expo, September 24, 2011, University of Alberta, Canada.
- Coordinator for the 1st Year Student Information Evening, March 16, 2011, University of Alberta, Canada.

Service to the Nation, State and Community

I have been a very active reviewer in petroleum engineering, mainly in the areas of petroleum phase behavior, enhanced oil recovery, heavy-oil/bitumen recovery, and compositional reservoir simulation. I was an associate editor for the *Journal of Natural Gas Science and Engineering* 2014 – 2017, and have been an associate editor for *SPE Journal* since 2016. I was awarded three times as technical reviewer as follows:

Technical Editor Award, *SPE Reservoir Evaluation & Engineering*, SPE, September 2016
Technical Editor Award, *SPE Reservoir Evaluation & Engineering*, SPE, September 2015
Excellence in Peer Review, *Journal of Natural Gas Science & Engineering*, Elsevier, June 2014.

I enjoy helping researchers through constructive, timely comments for many journals (currently 25 journals). I also give reviews for the American Chemistry Society (Petroleum Research Fund) and the Natural Sciences and Engineering Research Council of Canada (NSERC) (Discovery Grants and Collaborative Research and Development Grants). NSERC recently appointed me as a member of the Materials and Chemical Engineering Evaluation Group for Discovery Grants at NSERC. It is an important position to review grant applications (approximately 200 applications per year) submitted by professors at Canadian universities. As they describe it, NSERC places a great deal of emphasis on finding highly qualified individuals to act as Evaluation Group members. This will involve thorough assessment of applications in Ottawa using a whole week in February, for which NSERC covers all travel and living expenses.

I also served as Examiner for “Secondary and Enhanced Oil Recovery” for National Exams for Professional Engineers Ontario, 2012 – 2014.

**PGE Budget Council Statement
For
Ryosuke Okuno**

Honors and Other Evidence of Merit or Recognition, Including Contracts and Grants

Dr. Ryosuke Okuno has been successful in attracting research funding from various industry sources. The amount of research funding he has brought in at his previous position at the University of Alberta was C\$ 613,965 + \$40,000 USD, while at his present position at UT Austin it totals \$442,845. His UT funding derives as a Principal Investigator of research grants from Japan Petroleum Exploration and Japan Canada Oil Sands, with funding of \$115,878 and \$76,967 respectively, and the joint-industry programs (JIPs) of Dr. Kishore Mohanty (\$100,000) and Dr. Gary Pope (\$150,000). Note that for the latter two funding sources there is strong internal competition for the funding, with faculty having to present, compete, and get their projects approved by the member companies of the respective JIPs. Dr. Okuno did this successfully, and the funding as indicated is therefore 100% assigned to him as PI of the project. Note that Dr. Okuno joined UT Austin during an exceptional downturn in the petroleum industry after 2015, which was accompanied by a great hesitancy by industry sponsors to support academic R&D. This has reduced the opportunities of all Petroleum Engineering faculty, including Dr. Okuno, to attract more funding in the period after 2015. This situation, like every other prior downturn in the petroleum industry, is only temporary, and growth in funding for Petroleum Engineering research in general, and for Dr. Okuno's work in particular, is logically to be expected in the coming years.

Dr. Okuno's expertise is highly sought after by his peers, and he has taken on an exceptional lead role as an associate / technical editor and reviewer, with the following activities and responsibilities:

1. Associate Editor, SPE Journal, Society of Petroleum Engineers, 2016-present.
2. Associate Editor, Journal of Natural Gas Science & Engineering, Elsevier, 2014-2017.
3. Guest Editor, Special Issue on "Advances in Unconventional Oil and Gas Resources," Journal of Earth Science, Springer, 2017.
4. Discussion Leader for Session VII: Challenges in Reservoir Modeling and Surveillance of Unconventional Technologies in the SPE Forum on "Low Carbon Intensity Processes for Low-Mobility Oil Recovery", Newport Beach, California, USA, July 27 – August 1, 2014.
5. Moderator for SPE PetroWiki in the area of phase diagrams, 2013 – present.
6. Reviewer for Advances in Water Resources
7. Reviewer for AIChE Journal
8. Reviewer for American Chemical Society, Petroleum Research Fund
9. Reviewer for ASME Journal of Energy Resources Technology
10. Reviewer for ASME Journal of Fluids Engineering
11. Reviewer for Chemical Engineering & Technology
12. Reviewer for Chemical Engineering Research and Design
13. Reviewer for Chemical Engineering Science
14. Reviewer for Computational Geosciences

15. Reviewer for Energy & Fuels
16. Reviewer for Fluid Phase Equilibria
17. Reviewer for Fuel
18. Reviewer for Industrial & Engineering Chemistry Research
19. Reviewer for International Journal of Oil, Gas and Coal Technology
20. Reviewer for Journal of Petroleum Science & Engineering
21. Reviewer for SPE Journal
22. Reviewer for SPE Production & Operations Journal
23. Reviewer for SPE Reservoir Evaluation & Engineering Journal
24. Reviewer for Journal of Canadian Petroleum Technology (- 2015)
25. Reviewer for Journal of Marine and Petroleum Geology
26. Reviewer for Journal of Microencapsulation
27. Reviewer for Journal of Natural Gas Science & Engineering
28. Reviewer for Journal of Porous Media
29. Reviewer for Journal of the Japan Petroleum Institute
30. Reviewer for Journal of the Taiwan Institute of Chemical Engineers
31. Reviewer for Natural Sciences and Engineering Research Council of Canada (NSERC), Discovery Grants Program, and Collaborative Research and Development Grants
32. Reviewer for The Canadian Journal of Chemical Engineering

Moreover, Dr. Okuno has served as a member on international professional society and major governmental committees:

- Evaluation Group member for Materials and Chemical Engineering, The Natural Sciences and Engineering Council of Canada (NSERC), 2017 – present.
- EOR protocol technical review committee member, Government of Alberta, Canada, 2015.
- Selection committee member for the 2015 SPE Junior Faculty Research Award.
- Examiner for National Exams for Professional Engineers Ontario, 2012 – 2014.
- Committee and Conference Session Chair, The Japanese Association for Petroleum Technology, 2009 – 2010.

As an advisor, he is concerned with the mentoring of undergraduate students in particular. He has taken on the following roles:

- Faculty advisor for Elk Island PetroChallenge Student Event, December 18-19, 2012, Sherwood Park, Alberta, Canada.
- Faculty advisor, Engineering Expo, September 22, 2012, University of Alberta, Canada.
- Coordinated the 1st Year Student Information Evening, March 12, 2012, University of Alberta, Canada.
- Faculty advisor, Engineering Expo, September 24, 2011, University of Alberta, Canada.
- Coordinated the 1st Year Student Information Evening, March 16, 2011, University of Alberta, Canada.

Dr. Okuno has presented a large variety of invited talks at technical meetings with universities worldwide, including Stanford, TAMU, The University of Tulsa, LSU, Kyoto University, the University of Tokyo, the University of Alberta, Alberta School of Business, and Kazan National Research Technology University. He has also presented at Saudi Aramco / EXPEC ARC, INPEX


Corporation, Technical Research Center of Japan Oil, Gas and Metals National Corporation, JX Nippon Oil & Energy Corporation, Japan Petroleum Exploration Company, Japan Canada Oil Sands, and Schlumberger. He has also conducted two SPE webinars, which are virtual meetings conducted by the Society of Petroleum Engineers for a large global audience.


While in rank, Okuno has received the following honors, which very positively reflect on the quality of his research and his extensive peer review activities:

- Technical Editor Award, SPE Reservoir Evaluation & Engineering, SPE, September 2016.
- Pioneer Corporation Faculty Fellowship in Petroleum Engineering, September 2016.
- Technical Editor Award, SPE Reservoir Evaluation & Engineering, SPE, September 2015.
- Excellence in Peer Review, Journal of Natural Gas Science & Engineering, Elsevier, June 2014.
- SPE Petroleum Engineering Junior Faculty Research Initiation Award, September 2012.

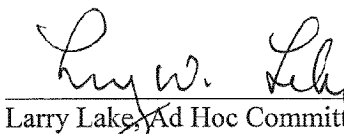
Concluding Remarks

The Budget Council Tenure and Promotion Committee has determined that Dr. Okuno's record of honors meets or exceeds expectations for promotion.


Kamy Sepehrnoori, Chair
PGE Tenure and Promotion Committee


Mukul M. Sharma


Eric van Oort


Larry Lake, Ad Hoc Committee Member

Candidate's Statement on Honors, and Other Evidence of Merit or Recognition, Including Contracts and Grants

Ryosuke Okuno, Ph.D., P.Eng.

I am a leading expert in the areas of petroleum phase behavior, enhanced oil recovery, heavy-oil/bitumen recovery, and compositional reservoir simulation. Most of the honors, contracts, and grants that I received are based on the recognition of my contributions to these areas.

Since becoming an assistant professor in October 2010, I have rapidly demonstrated an ability to acquire funding. During my tenure at the University of Alberta until August 2015, I received five external research grants (totaling CAD 613,965 plus USD 40,000), on all of which I was the sole PI. For one of them, I am a 2012 awardee for the highly competitive SPE Petroleum Engineering Junior Faculty Research Initiation Award. Three of them were competitive governmental research funds by the Natural Science and Engineering Research Council of Canada (NSERC) and the Canada Foundation for Innovation (CFI) (CAD 260,750 from NSERC and CAD 149,745 from CFI).

My move from the University of Alberta to UT Austin in August 2015 resulted in termination of all the contracts and several research projects held at Alberta (no research funds and/or equipment can cross the border). Furthermore, it was unfortunate that the transition to UT Austin was right after a substantial downturn in the petroleum industry, which started in November 2014. At UT Austin, I have received USD 115,878 + USD 76,966.95 from two companies as the sole PI thus far.

I also have three proposals approved for funding (totaling USD 289,251), awaiting for finalization of a research contract or grant installment. For one of them, I won competitive research funding on a new EOR method as the PI from Saudi Aramco (USD 199,000 with Dr. Larry W. Lake as the co-PI). I presented my research proposal at their conference held in Abu Dhabi as one of the 29 competitors invited after Saudi Aramco's initial selection of proposals. The invited competitors include those from research intensive universities, such as UT Austin (other research groups), Rice University, Imperial College, Colorado School of Mines, and the University of Alberta (to list a few), and industrial research institutes. My successful proposal was accepted through a dynamic discussion process with Saudi Aramco's technical team during and after the presentation. This demonstrated my ability to integrate their technical concerns and needs with my expertise into an academic research project.

I have given numerous invited talks at universities, research centers, and conferences. The most notable ones are Stanford University, Texas A&M University, Louisiana State University, Schlumberger DBR Technology Center, Computer Modelling Group, SPE forum, and SPE Webinar. For one of them, I served as a discussion leader in the SPE Forum on "Low Carbon intensity Processes for Low-Mobility Oil Recovery" held in Newport Beach, California, July 27 – August 1, 2014. This forum was attended by fifty two people who were selected based on their ability to contribute to the forum, as judged by the steering committee from information supplied on the applications. I successfully facilitated the session on "Challenges in Reservoir Modeling and Surveillance of Unconventional Technologies". As SPE described it, they invited me to serve as a discussion leader because of my reputation as a leading professional in my field and my ability to share critical knowledge throughout the oil and gas industry.

I am active in contributing to scholarly and professional organizations. I have been Associate Editor for peer-reviewed journals since 2014 (*SPE Journal* since 2016, the *Journal of Natural Gas Science & Engineering* 2014 – 2017). I recently was appointed as a member for the Materials and Chemical Engineering Evaluation Group for Discovery Grants at NSERC. It is an important position to review

grant applications (approximately 200 applications per year) submitted by professors at Canadian universities. As they describe it, NSERC places a great deal of emphasis on finding highly qualified individuals to act as Evaluation Group members.

A short summary of significant honors in rank are as follows:

- Technical Editor Award, *SPE Reservoir Evaluation & Engineering*, SPE, September 2016.
- Pioneer Corporation Faculty Fellowship in Petroleum Engineering, The University of Texas at Austin, September 2016.
- Technical Editor Award, *SPE Reservoir Evaluation & Engineering*, SPE, September 2015.
- Excellence in Peer Review, *Journal of Natural Gas Science & Engineering*, Elsevier, June 2014.
- SPE Petroleum Engineering Junior Faculty Research Initiation Award, September 2012.

LETTERS RECEIVED

Letters should be listed alphabetically by last name.

1 Name of reviewer, rank or title, department, university	Dr. Walter Chapman, William W. Akers Professor of Chemical and Biomolecular Engineering, Associate Dean for Energy Research, George Brown School of Engineering, Rice University
Brief statement of expertise and reason for selection*	Well known for his work in asphaltene phase behavior, thermodynamics modeling, molecular theory development, and flow assurance.
Other relevant information**	
Nominated by	Budget Council
Date letter received	July 18, 2017

2 Name of reviewer, rank or title, department, university	Dr. Milind Deo, Professor and Department Chair, Department of Chemical Engineering, University of Utah
Brief statement of expertise and reason for selection*	Leading expert in reservoir engineering applications to unconventional (shale) resources
Other relevant information**	
Nominated by	Budget Council
Date letter received	August 27, 2017

3 Name of reviewer, rank or title, department, university	Dr. Robert Enick, NETL ORISE Faculty Fellow, Covestro Professor and Vice Chair for Research, Department of Chemical and Petroleum Engineering, University of Pittsburgh
Brief statement of expertise and reason for selection*	Leading expert in high-pressure phase behavior, CO2 enhanced oil recovery, high temperature high-pressure viscometry, CO2 capture solvent design.
Other relevant information**	
Nominated by	Candidate
Date letter received	August 8, 2017

4 Name of reviewer, rank or title, department, university	Dr. Iraj Ershaghi, NAE, Professor and Director of Petroleum Engineering, Mork Family Department of Chemical Engineering and Materials Science, University of Southern California
Brief statement of expertise and reason for selection*	NAE. He is an expert in the areas of naturally fractured reservoirs, pressure transient modeling, reservoir engineering, and reservoir characterization.
Other relevant information**	
Nominated by	Budget council
Date letter received	August 20, 2017

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

5 Name of reviewer, rank or title, department, university	Dr. Turgay Ertekin, Professor Emeritus and Department Head, John and Willie Leon Family Department of Energy and Mineral Engineering, Penn State University
Brief statement of expertise and reason for selection*	Department chair, well known for his work in the areas of reservoir simulation, natural gas engineering, unconventional reservoirs, and coal seam degasification.
Other relevant information**	
Nominated by	Budget Council
Date letter received	July 11, 2017

6 Name of reviewer, rank or title, department, university	Dr. John Lee, NAE, Professor, Harold Vance Department of Petroleum Engineering, Texas A&M University
Brief statement of expertise and reason for selection*	NAE, Honorary life member of SPE, comes from a peer school and department, leading expert in petroleum engineering.
Other relevant information**	
Nominated by	Budget Council
Date letter received	August 16, 2017

7 Name of reviewer, rank or title, department, university	Dr. Sanjay Srinivasan, Department Chair and Professor, John and Willie Leon Family Department of Energy and Mineral Engineering, Penn State University
Brief statement of expertise and reason for selection*	Peer school and department, known for his work in the areas of reservoir characterization, improved management of reservoir recovery processes, geological CO2 sequestration, and geostatistic for reservoir modeling.
Other relevant information**	Srinivasan was a professor at UT-Austin at the same time Okuno was present, but did not participate on his committee nor teach him any classes.
Nominated by	Candidate
Date letter received	July 17, 2017

8 Name of reviewer, rank or title, department, university	Dr. Hamdi Tchelepi, Professor and Co-Director of Center for Computational Earth and Environmental Science, Department of Energy Resources Engineering, Stanford University
Brief statement of expertise and reason for selection*	Peer school and department, expert in reservoir simulation development and application, development of phase behavior algorithms, and multi-scale reservoir simulators.
Other relevant information**	
Nominated by	Budget Council
Date letter received	August 18, 2017

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

DECLINATIONS

Those declining to provide a review letter should be listed *alphabetically* by last name.

1 Name of reviewer, rank or title, department, university	Dr. Jalal Abedi, Professor, Department of Chemical and Petroleum Engineering, University of Calgary
Brief statement of expertise and reason for selection*	Leading expert in phase behavior of heavy oils, waste gasification, and biofuel production.
Other relevant information**	
Nominated by	Candidate
Declination – date received and reason	June 30, 2017 – “I am not able to evaluate the promotion dossier ... at this time.” No other reason provided.

2 Name of reviewer, rank or title, department, university	Dr. Akhil Datta-Gupta, NAE, University Distinguished Professor and Regents Professor, Harold Vance Department of Petroleum Engineering, Texas A&M University
Brief statement of expertise and reason for selection*	NAE, world expert in reservoir engineering and enhanced oil recovery.
Other relevant information**	
Nominated by	Budget Council
Declination – date received and reason	June 29, 2017 – Busy summer travel schedule.

3 Name of reviewer, rank or title, department, university	Dr. Erling Stenby, Department Head, Department of Chemistry, Technical University of Denmark
Brief statement of expertise and reason for selection*	Well known for his work in applied thermodynamics, enhanced oil recovery, phase behavior, and CO2 capture and storage.
Other relevant information**	
Nominated by	Budget Council
Declination – date received and reason	July 5, 2017 – Summer vacation schedule.

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

NO RESPONSE

Those not responding to the request to provide a review letter should be listed *alphabetically* by last name.

1 Name of reviewer, rank or title, department, university	Dr. Arne Graue, Professor, Department of Physics and Technology, University of Bergen
Brief statement of expertise and reason for selection*	Leading expert in enhanced oil recovery and gas injection.
Other relevant information**	
Nominated by	Budget Council

2 Name of reviewer, rank or title, department, university	Dr. Long Nghiem, Vice President of Research and Development, Computer Modeling Group Ltd (CMG), Adjunct Professor in Chemical and Petroleum Engineering, University of Calgary
Brief statement of expertise and reason for selection*	Reservoir modeling expert familiar with the incorporation of phase behavior models into simulators.
Other relevant information**	
Nominated by	Budget Council

3 Name of reviewer, rank or title, department, university	Dr. D.-Y. Peng, Canada Academy of Engineering, Professor, Department of Chemical and Biological Engineering, University of Saskatchewan
Brief statement of expertise and reason for selection*	Thermodynamics and phase behavior expert, co-author of one of the most famous and widely used relationships in petroleum engineering, the Peng-Robinson equation.
Other relevant information**	Initially said yes, but asked for the guidelines for promotion at UT. I responded and never heard from him again.
Nominated by	Budget Council

4 Name of reviewer, rank or title, department, university	Dr. Arne Skauge, Professor and Director, Center for Integrated Petroleum Research, University of Bergen
Brief statement of expertise and reason for selection*	Enhanced oil recovery expert with large industry sponsored research program in Norway.
Other relevant information**	
Nominated by	Budget Council

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.



DEPARTMENT OF PETROLEUM AND GEOSYSTEMS ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

CPE 2.502 • Austin, Texas 78712 • (512) 471-3161 • Telefax (512) 471-9605

June 29, 2017

Dr. Iraj Ershaghi
Professor and Director of Petroleum Engineering
Mork Family Department of Chemical Engineering and Material Science
University of Southern California
ershaghi@usc.edu

Dear Dr. Ershaghi:

The Department of Petroleum & Geosystems Engineering at The University of Texas at Austin is considering Assistant Professor Ryosuke Okuno for tenure and for advancement in rank to the position of Associate Professor. We would appreciate your candid assessment of his scholarly contributions to assist our decision-making process. Excellent teaching is an important criterion for promotion, but our evaluation of teaching is being carried out separately, and we are asking you only for information about his scholarly distinction. Copies of Dr. Okuno's curriculum vitae and several recent papers are enclosed for your review, as well as a brief research statement.

UT Austin normally considers a faculty member for promotion to associate professor upon completion of five years in probationary status as an assistant professor. However, Dr. Okuno had completed five years as an assistant professor at the University of Alberta prior to joining UT Austin in September 2015, and per school policy, he was required to complete at least two but no more than 5 years in residence at UT-Austin before going up for promotion. Under these circumstances, the criteria for promotion and tenure are no different than for faculty whose tenure clock has not been extended. We therefore request that this situation not be a factor in your letter of evaluation.

For Your Letter: We would appreciate your opinions regarding Dr. Okuno's major engineering and/or scientific contributions. In preparing your assessment, please consider the following questions, as well as including any other factors you deem salient:

1. Do you know Dr. Okuno, and if so, for how long and under what circumstances?
2. What are the original, innovative, and/or important contributions that he has made in his field of research? Have his publications influenced the thinking of, or the methods used by, you or others in your field?
3. How would you assess Dr. Okuno's development compared with others in his cohort at research-intensive universities?
4. What is your perspective on Dr. Okuno's promise for further professional growth and leadership?

We would be grateful for any additional comments you might have. The more specific you can be in your comments, the more helpful your evaluation will be.

Under the laws of the State of Texas, Dr. Okuno has the right to request to see any materials in his personnel file, including your letter. Members of our faculty and internal review committees who see your letter as part of the promotion process will hold the comments you make in confidence, however.

Deadline: We would like to receive a signed letter from you by July 17, 2017. If this date is a problem, please contact me as soon as possible as we want to do everything we can to enable you to provide us with an evaluation. It is not necessary for you to send us a hard copy of your letter - an electronic or scanned version is sufficient, provided your institutional letterhead and your signature are included. In addition, please enclose a copy of a short version of your curriculum vitae or résumé (preferably no longer than two pages). If you have questions, please call me at the number given on the letterhead.

Thank you for your time and assistance with this important matter. I realize that the amount of time required to do a thoughtful review is considerable.

Sincerely,

A handwritten signature in dark ink, appearing to read "Jon E. Olson".

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
The Lois and Richard D. Folger Leadership Chair

From: Olson, Jon
Sent: Thursday, June 29, 2017 1:54 PM
To: ershaghi@usc.edu
Cc: Olson, Jon; Stickney, Stephanie
Subject: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Iraj - I have attached a letter requesting you to evaluate the promotion dossier of one of our assistant professors, Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help again this year – I greatly appreciate your letter from last year for Dr. Quoc Nguyen, who was successfully promoted.

Please respond to this email as soon as is convenient as to whether you can do this evaluation. Assuming you are willing to participate, the deadline we are requesting for receiving your letter is July 17.

Thanks so much for your time and consideration.

-Jon

Link to significant papers:

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGSkMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems
Engineering | 512-471-7375 | www.pge.utexas.edu

Ryosuke Okuno, Ph.D., P.Eng., Univ. of Texas at Austin, June 21, 2017

Five publications attached

1. Okuno, R. and Xu, Z., Mass Transfer on Multiphase Transitions in Low-Temperature Carbon-Dioxide Floods, SPE Journal, Volume 19, Number 6, pp. 1005-1023, December 2014.
2. Kumar, A. and Okuno, R., Direct Perturbation of the Peng-Robinson Attraction and Covolume Parameters for Reservoir Fluid Characterization, Chemical Engineering Science, Volume 127, pp. 293-309, May 4, 2015.
3. Zhu, D. and Okuno, R., Multiphase Isenthalpic Flash Integrated with Stability Analysis, Fluid Phase Equilibria, Volume 423, pp. 203-219, September 15, 2016.
4. Kumar, A. and Okuno, R., A New Algorithm for Multiphase Fluid Characterization for Solvent Injection, SPE Journal, Volume 21, Issue 5, October 2016.
5. Gao, J., Okuno, R., and Li, H.A., An Experimental Study of Multiphase Behavior for n-Butane/Bitumen/Water Mixtures, SPE Journal, Volume 22, Issue 3, June 2017.

Overall research accomplishments

The main subject of my research is to understand the interplay between subsurface flow and phase behavior for oil/gas recovery from conventional and unconventional reservoirs. Such theory is necessary to reliably design many recovery processes, such as injection of gas, solvent, steam, and surfactant. I have developed a research program to address fundamental and practical research problems by using the compositional framework of petroleum reservoir engineering, in which thermodynamics plays an important role.

As part of my Ph.D., I developed new algorithms for multiphase equilibria using a cubic equation of state (EOS), and implemented them in UTCOMP, which is one of the most advanced compositional reservoir simulators. The updated UTCOMP with my algorithms enabled me to investigate detailed mechanisms of oil displacement by solvent with complex multiphase behavior. The research experience during my Ph.D. studies also gave me an analytical understanding of multicomponent multiphase flow for reservoir engineering.

One of the research abilities unique to me is the utilization of compositional phase behavior when they are coupled with multiphase flow for enhanced oil recovery (EOR). An important contribution in this area is the novel application of gas injection theory to three-hydrocarbon-phase flow, where critical endpoints play important roles in oil displacement (#1. Okuno and Xu, SPE Journal, 2014).

The main research program that I developed in rank is on bitumen recovery by steam-solvent coinjection (started at Univ. of Alberta). Bitumen recovery by coinjection of steam and solvent is a complex process, where energy and mass balances in heterogeneous porous media are coupled with thermodynamics of both equilibrium and non-equilibrium. Such processes should be designed based on reliable representation of multiphase behavior for size-asymmetric mixtures including polar components, consisting of bitumen, water, and solvent, for a wide range of temperature (e.g., 300 – 520 K). The conventional cubic EOS may not be satisfactorily applicable for such mixtures, as we showed for n-butane/bitumen/water mixtures in the experimental paper, Gao et al. (#5. SPE Journal, 2017).

My first Ph.D. student, Dr. Ashutosh Kumar, studied characterization of oil/solvent mixtures by use of the Peng-Robinson EOS in a series of publications. In Kumar and Okuno (#2. Chemical Engineering Science 2015), for example, the novel method of reservoir fluid characterization directly adjusts the attraction and covolume parameters of components, unlike the conventional characterization methods. The most important feature of the method is that it can control phase behavior predictions monotonically and systematically in pressure-temperature-composition space. In a more recent paper (#4. Kumar and Okuno, SPE Journal, 2016), we presented the first systematic method of multiphase fluid characterization for up to three hydrocarbon phases. These characterization methods were carefully tested for phase behavior data for more than 90 different reservoir fluids, and they were implemented in two separate pieces of in-

Ryosuke Okuno, Ph.D., P.Eng., Univ. of Texas at Austin, June 21, 2017

house software. For this research, I am a 2012 awardee for the competitive SPE Petroleum Engineering Junior Faculty Research Initiation Award. Dr. Ashutosh Kumar is currently a full professor at Indian Institute of Technology Dhanbad (a.k.a. Indian School of Mines).

Robust and efficient solution for phase behavior is crucial for EOS-based compositional reservoir simulation. In simulation of steam-solvent coinjection for bitumen recovery, phase behavior solution can be much more difficult since mass-balance, energy-balance, and phase behavior equations are all coupled. We studied multiphase behavior calculation for isenthalpic flash, for which the total enthalpy and pressure are specified for a given overall composition. This type of flash calculations has been known to be important, but difficult for steam-injection simulation. In Zhu and Okuno (#3. Fluid Phase Equilibria, 2016), the main difficulty associated with phase transitions in steam injection problems was identified. We then proposed a way to improve the problem by conducting phase-split and phase-stability calculations simultaneously in an integrated manner. The algorithm has been further improved since the publication, and the most updated algorithm for isothermal flash is currently under review for publication.

Direction

I would categorize my research into two main areas: 1) Phase behavior and 2) Enhanced oil recovery (EOR). Since phase behavior is one of the most fundamental subjects in Petroleum Engineering, it was part of my long-term plan to study several topics of phase behavior with the first group of my students. This is why the majority of the publications made so far are in the area of phase behavior. The on-going projects in my group at University of Texas at Austin (UT Austin) are around the intersection of the two areas, concerned with the utilization of phase behavior for EOR. Also, I see my future publications more balanced between experimental and modeling research.

My vision as a researcher at UT Austin is twofold. Firstly, I will continue to develop new knowledge of petroleum phase behavior, with the immediate focuses on heavy-oil/bitumen and on unconventional resources, such as tight oil and shale gas. Secondly, I will develop novel methods of oil/gas recovery by use of new EOR injectants, and/or by hybrid mechanisms, such as thermal/miscible EOR and chemical/miscible EOR.

My move from University of Alberta to UT Austin in August 2015 resulted in termination of all the contracts and several research projects held at Alberta (no research fund and equipment can cross the border). Nevertheless, it was a good opportunity for me to widen my research areas and build the experimental capability of my research group.

My lab at UT Austin is equipped with high-temperature/high-pressure equipment for phase behavior/EOR studies, such as a PVT cell, core-flooding systems, gas chromatograph, permanent gas analyzer, viscometer, densitometer, slim-tube, mixing cells, pumps, and ovens. The lab became fully functional during the Spring of 2017, because some pieces of equipment required renovations of the lab. Now, several students are conducting experimental research for solvent-based methods for bitumen recovery. They started producing high-quality data, some of which will be presented at the SPE Annual Technical Conference in October, 2017.

I am currently working to develop two industrial affiliate programs (IAPs): one on ethane-based EOR, and the other on improved recovery of tight oil. One of my publications on the former subject (McGuire et al. SPE REE 2016) was featured in *The American Oil & Gas Reporter* as February 2017 Cover Story. We held the first public meeting for the Ethane EOR IAP at UT Austin on June 1, 2017 with me as the PI and Professor Larry W. Lake, and Professor Kishore K. Mohanty as the co-PIs. The meeting was attended by 42 people (in person and on line) from the 26 companies registered for the meeting.

For research on tight-oil recovery, I believe that it is crucial to integrate two areas of expertise, reservoir engineering (including EOR) and horizontal-drilling/hydraulic-fracturing technologies. For this purpose, I am collaborating with Professor Mukul M. Sharma for initiating the tight-oil IAP.

BC



Walter G. Chapman, Associate Dean of Engineering
Department of Chemical and Biomolecular Engineering

July 17, 2017

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin
Petroleum and Geosystems Engineering

Dear Professor Olson:

It is my pleasure to write a letter of evaluation of Dr. Ryosuke Okuno. Dr. Okuno is in a field of research related to my own, but we have not had significant overlap in our research areas. I have enjoyed becoming familiar with Dr. Okuno's research through his dossier. His research funding level appears good although he has had to essentially start over after moving from the University of Alberta. Dr. Okuno clearly has goals to expand his industrial funding through multiple IAP's. I do not consider research funding to be a concern since, as the impact of his research continues to grow, he will find new research and funding opportunities.

Dr. Okuno has graduated one PhD student and seven Master's students. The large number of master's students might be reasonable for the University of Alberta or a Petroleum Engineering program. In my experience, master's students take a considerable time commitment without producing the volume of research output from doctoral students. I expect this balance of doctoral to master's students to become more reasonable at the University of Texas. Dr. Okuno's production of published manuscripts is reasonable for a faculty member at this stage of his career.

Phase behavior is a key component in oil recovery. Dr. Okuno's doctoral studies revolved around phase behavior modeling. He is developing a range of tools to characterize crude oils and to perform robust stability and phase behavior calculations. He has moved beyond his doctoral research in modeling mass transfer and in producing experimental data related to systems containing bitumen and water. The SPE 2014 paper on gas injection is intriguing. In modeling bitumen systems, data is always lacking and the data presented in SPE 18073 helps fill an important gap for systems that include water. The study also identifies that more advanced models are required for these systems. Dr. Okuno's interest to move into shale oil and gas will yield new opportunities for experiment and modeling.

Dr. Okuno's publications are in quality journals and the research is of high quality. As his research focus moves from the bitumen of Alberta to shale oil and enhanced oil recovery projects more common in this region, I expect his research program to continue to grow. Based on the quality and depth of the research, I recommend promotion to associate professor with tenure.

Sincerely,

Walter G. Chapman
Associate Dean of Engineering for Energy Research
William W. Akers Chair Professor, Chemical and Biomolecular Engineering Department

E-mail: chapman@rice.edu | Office: (512) 937-7271 | Fax: (512) 937-7272 | Cell: (512) 937-7273
1515 Texas Avenue, Suite 1400, Houston, TX 77002-1362 | www.rice.edu/chbe

Brooks, Allison B

From: Stickney, Stephanie
Sent: Friday, September 15, 2017 11:50 AM
To: Brooks, Allison B
Subject: FW: Promotion Letter Request, Ryosuke Okuno, University of Texas
Attachments: Two_Page_CV_wgc_5_2017.pdf; Promotion of Ryosuke Okuno UTAustin.pdf

From: <Olson>, Jon Olson
Date: Tuesday, July 18, 2017 at 11:51 AM
To: Stickney
Subject: FW: Promotion Letter Request, Ryosuke Okuno, University of Texas

FYI.

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Walter G. Chapman [<mailto:wgchap@rice.edu>]
Sent: Tuesday, July 18, 2017 12:53 AM
To: Olson, Jon <jolson@austin.utexas.edu>
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Jon:

Please find attached a brief CV for myself and a letter concerning the promotion of Dr. Okuno.

Best Wishes,

Walter

Walter G. Chapman
Associate Dean of Engineering for Energy Research
William W. Akers Chair Professor
Chemical and Biomolecular Engineering Dept., MS-362
Rice University
6100 Main St.
Houston, TX 77005

phone: (713)-348-4900
<https://chbe.rice.edu/Content.aspx?id=67>

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]
Sent: Friday, July 07, 2017 9:23 AM

To: Walter G. Chapman

Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Oops. Sorry. I sent you the wrong person's papers. Here is the correct link. -Jon

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGskMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor

Lois K. and Richard D. Folger Leadership Chair

The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Olson, Jon

Sent: Friday, July 07, 2017 9:12 AM

To: 'Walter G. Chapman' <wgchap@rice.edu>

Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Hi Walter – I also sent a link to copies of 5 significant papers. Here it is again. -Jon

https://www.dropbox.com/sh/scsqexs5wk2nzs5/AADhOcL4F_6G2CtpRJkvagta?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor

Lois K. and Richard D. Folger Leadership Chair

The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Walter G. Chapman [<mailto:wgchap@rice.edu>]

Sent: Thursday, July 06, 2017 11:51 PM

To: Olson, Jon <jolson@austin.utexas.edu>

Cc: Stickney, Stephanie <stickney@austin.utexas.edu>

Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Hi Jon:

I have your cover letter, a description of research, and a CV. Let me know if there are any other documents.

Best Wishes,

Walter

On July 6, 2017 5:08:14 PM CDT, "Olson, Jon" <jolson@austin.utexas.edu> wrote:

Thanks Walter. And you have all the documents that I sent? -Jon

Jon E. Olson

Chair and Professor, Petroleum and Geosystems Engineering

512-471-7375

From: Walter G. Chapman [<mailto:wgchap@rice.edu>]
Sent: Thursday, July 06, 2017 5:05 PM
To: Olson, Jon
Cc: Stickney, Stephanie
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Jon:

Thank you for the phone call. Yes, I will be able to evaluate the promotion dossier and respond by July 17.

Best Wishes,

Walter

Walter G. Chapman
Associate Dean of Engineering for Energy Research
William W. Akers Chair Professor
Chemical and Biomolecular Engineering Dept., MS-362
Rice University
6100 Main St.
Houston, TX 77005

phone: (713)-348-4900
<https://chbe.rice.edu/Content.aspx?id=67>

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]
Sent: Thursday, June 29, 2017 1:50 PM
To: wgchap@rice.edu
Cc: Olson, Jon; Stickney, Stephanie
Subject: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Walter - I have attached a letter requesting you to evaluate the promotion dossier of one of our assistant professors, Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Please respond to this email as soon as is convenient as to whether you can do this evaluation. Assuming you are willing to participate, the deadline we are requesting for receiving your letter is July 17.

Thanks so much for your time and consideration.

-Jon

Link to significant papers:

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGskMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

WALTER G. CHAPMAN

Rice University, Department of Chemical Engineering, Houston, TX 77005

EDUCATION

B.S. in Chemical Engineering, *Summa Cum Laude*, Clemson University 1983

Ph.D. in Chemical Engineering, Cornell University 1988

PROFESSIONAL EMPLOYMENT

Associate Dean of Engineering for Energy Research (2014-Present)

W.W. Akers Professor 2005-Present, Professor (2001-2005), Associate Professor (1996-2001), Assistant Professor (1990-1996) – Rice University

Chair, Chemical and Biomolecular Engineering Dept. (2013-2014)

Director, Energy and Environmental Systems Institute (2005-2011)

Visiting Professor, TU Berlin (May and June 2001), TU Denmark (July 2001)

Sabbatical Leave, 1997-1998 – Shell Oil Products Company, Houston, TX

Research Engineer, 1988-1990 – Shell Development Company, Houston, TX

Graduate Student, 1983-1988 – Cornell University, Thesis committee: Professors K. E. Gubbins (Chair), W. B. Streett, and H. A. Scheraga.

HONORS AND AWARDS

Professional Excellence Award, Chemical Engineering Alumni Board, Rice Univ., 2012

George R. Brown Award for Superior Teaching, Rice Univ. 2011

Donald Katz Award, Gas Processors Association, 2010

Top 15 Most Cited Paper in the 100 Years of I&EC Research, 2015

Invited Chapter in Advances in Chemical Physics, Vol. 160, 2016

Best Applied Paper Award, South Texas Section, AIChE – 2005, 2011, 2016

Best Fundamental Paper Award, South Texas Section, AIChE – 2016

Editorial Advisory Board for Energy and Fuels, 2009-Present

Outstanding Young Alumni Award 2001, Clemson Univ., College of Eng. and Science

Outstanding Teacher / Mentor Award, Chemical Engineering Seniors, 2007 and 2011

Graduate Student Association Faculty Teaching and Mentoring Award, Rice Univ., 2001

Nicolas Salgo Distinguished Teaching Award for Undergraduate Teaching, Rice Univ., 2001

SELECTED RECENT PUBLICATIONS

1. Xiaoqun Mu, Florian Frank, Faruk O. Alpak, and Walter G. Chapman, "Stabilized density gradient theory algorithm for modeling interfacial properties of pure and mixed systems," Fluid Phase Equilibria, 435, 118-130 (2017).
2. Pradeep Venkataraman, Kyriacos Zygourakis, Walter G. Chapman, Scott L. Wellington, and Michael Shammai, "Molecular Insights into Glass Transition in Condensed Core Asphaltenes," Energy & Fuels, 31, 1182-1192 (2017).
3. Le Wang, Dilip Asthagiri, Yongchao Zeng, and Walter G. Chapman, "Simulation Studies on the Role of Lauryl Betaine in Modulating the Stability of AOS Surfactant-Stabilized Foams Used in Enhanced Oil Recovery," Energy & Fuels, 31, 1512-1518 (2017).
4. "Thermodynamic Perturbation Theory for Associating Molecules," Bennett D. Marshall and Walter G. Chapman, Advances in Chemical Physics, Vol. 160, 1-47, Editors: Stuart A. Rice and Aaron R. Dinner (2016).
5. Artee Bansal, Dilip Asthagiri, Kenneth R. Cox, and Walter G. Chapman, "Structure and thermodynamics of a mixture of patchy and spherical colloids: A multi-body association theory with complete reference fluid information," J. Chem. Phys., 145, 074904 (2016).
6. Amin Haghmoradi, Le Wang, and Walter G. Chapman, "A new equation of state for associating Lennard-Jones fluids with two sites: small bond angle," Molec. Phys., 114, 2548-2557 (2016).

7. Amin Haghmoradi, Le Wang, and Walter G. Chapman, "A density functional theory for colloids with two multiple bonding associating sites," J. Phys.: Cond. Matter 28, 244009 (2016).
8. Wael A. Fouad, Le Wang, Amin Haghmoradi, Sumnesh K. Gupta, and Walter G. Chapman, "Understanding the Thermodynamics of Hydrogen Bonding in Alcohol-Containing Mixtures: Self-Association," J. Phys. Chem. B, 119, 14086-14101 (2015).
9. Deepti Ballal and Walter G. Chapman, "Competition between Intra- and Intermolecular Association of Chain Molecules with Water-like Solvent," J. Phys. Chem. B, 119, 6792-6802 (2015).
10. Bennett D. Marshall and Walter G. Chapman, "Thermodynamic perturbation theory for self-assembling mixtures of multi-patch colloids and colloids with spherically symmetric attractions," Soft Matter, 9, 11346-11356 (2013).

TECHNOLOGY TRANSFER OF DATA AND MODELS

Developed the Statistical Associating Fluid Theory (SAFT) property model now used for design and optimization throughout the high performance polymer, energy, and chemical industries. SAFT models are available through most process simulator companies.

The Jain-Dominik-Chapman (JDC) free energy functionals that are the primary method for polymer / nanoparticle systems in Sandia National Lab's open source Tramoto density functional theory package for nanostructured fluids in materials and biology.

Developed new experimental equipment to measure water content of natural gas in equilibrium with hydrates at cryogenic conditions and in equilibrium with liquid water at high pressures and temperatures. The data and model were transferred to gas processors.

Developed a model for asphaltene precipitation and deposition in crude oil systems used by energy companies including Chevron, ADNOC, Total, Schlumberger, Calsep, and VLXE.

RECENT COLLABORATORS

Gabi Sadowski –University of Dortmund

Yurij Kalyuzhnyi – Institute for Condensed Matter Physics, Lviv, Ukraine

Jill Buckley – New Mexico Tech

Amalie Frischknecht – Sandia National Lab

ADVISEES AND FORMER ADVISEES

Graduate: Mario Llano Restrepo (Univ. del Valle, Cali, Colombia), Dhananjay Ghonasgi (Phillips), Victor Perez (Texaco), Pallav Jain (Duke Business School), Chad Segura (Aspen Tech), Alejandro Garcia Cuellar (Monterrey Tech), Prasanna K. Jog (Dow Chemical Company), Sharon G. Sauer (Rose-Hulman Institute), Jie Zhang (Schlumberger), David Ting (Shell Global Solutions); Auleen Ghosh (Intel), Sandeep Tripathi (GE), Shuqiang Gao (Champion Technologies), Matthew Yarrison (Consulting), Piyush Srivastava (Baker-Petrolite), Aleksandra Dominik (Shell), Doris Gonzalez (Schlumberger), Gaurav Bhatnagar (Shell), Shekhar Jain (Shell), Adam Bymaster (ExxonMobil), Clint Aichele (Oklahoma State University), Mesude Avci (Univ. of Oklahoma), Francisco Vargas (Rice Univ.), Chris Emborsky (Shell), Sayantan Chatterjee (Shell), Zhengzheng Feng (Shell), Guangsheng Gu, Sai Panuganti (BP), Kai Gong (Sinopec), Ben Marshall (ExxonMobil), Deepti Ballal (Ames Research), Wael Fouad (Petroleum Institute), Ali Al Hammadi (Petroleum Institute), Hassan Al Asiri (King Fahd Univ.)

Senior Researcher: Anju Kurup (BP), Keshawa P. Shukla (Antares Offshore), Yi Chen (Schlumberger), Kyoo Song (Retired), Essmail Djamali, Pradeep Venkataraman (Baker Hughes), Dilip Asthagiri, Kai Langenbach

BC



Dr. Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
The Lois and Richard D. Folger Leadership Chair

August 27, 2017

Dear Professor Olson:

I am writing this letter in the evaluation of Dr. Ryosuke Okuno for tenure in the Department of Petroleum Engineering at the University of Texas, in Austin. I am basing this evaluation on his CV, research plan and review of some sample publications. I do not personally know Dr. Okuno, but am aware of his papers on phase behavior since I work in a related area.

Dr. Okuno works in the area of phase behavior with an interest in understanding the role of chemical composition on fluid displacement processes in reservoirs. Understanding reservoir fluids and their thermodynamics within the reservoir during injection-production processes is important for estimating and improving recoveries. This work at the interface of chemical and petroleum engineering is important also in evaluating the production of near-critical fluids in tight-oil and shale plays.

Dr. Okuno has an impressive publication record. He has published in diverse journals – peer-reviewed SPE journals and in chemical engineering journals highlighting his phase behavior work. His work on phase behavior combined with mass transfer is particularly noteworthy and will have impact in developing better enhanced oil recovery processes in a variety of resources, ranging from light oil shale plays to heavy oil-sands. The characterization work provides guidelines for representing fluids ranging from condensates to heavy oils. The phase behavior transition work in oils in contact with carbon dioxide provide important information of transition between two-phase to three-phase equilibria, including liquid-liquid-vapor equilibria.

Dr. Okuno has worked with a number of graduate students. He has graduated one Ph.D. student from the University of Alberta, and is on track to graduate two Ph.D. students, one from University of Alberta, and the other from University of Texas.

His funding record is reasonably good. In a tough funding environment, Dr. Okuno has a number of grants from the industry. It would have been good to see support from the Department of Energy (U.S. DOE) or the National Science Foundation (NSF). However, opportunities at the U.S. DOE are at historical lows and the reception for Petroleum Engineering related research at NSF has not been promising.

Dr. Okuno has performed per expectations for a tenure-track assistant professor. He has advised and graduated a Ph.D. student, with two more close to completion. He publishes regularly, and his work is relevant and impactful in the area of phase behavior and enhanced oil recovery. He will need to diversify his funding sources as he continues to sustain and expand his research in the future. I recommend that Dr. Okuno be granted tenure and be promoted to Associate Professor in the Department of Petroleum Engineering at the University of Texas.

Best Regards

A handwritten signature in black ink, reading "Milind D. Deo". The signature is written in a cursive, flowing style.

Milind D. Deo
Meldrum Professor and Department Chair
Department of Chemical Engineering
University of Utah, Salt Lake City, UT

Brooks, Allison B

From: Stickney, Stephanie
Sent: Friday, September 15, 2017 11:53 AM
To: Brooks, Allison B
Subject: FW: Promotion Letter Request, Ryosuke Okuno, University of Texas
Attachments: deo_2017.pdf; ATT00001.htm; Dr. Okuno Evaluation.pdf; ATT00002.htm

From: <Olson>, Jon Olson
Date: Monday, August 28, 2017 at 7:33 AM
To: Stickney
Subject: Fwd: Promotion Letter Request, Ryosuke Okuno, University of Texas

this is the last one i believe.

Jon E. Olson, Chairman and Professor
Petroleum & Geosystems Engineering
The University of Texas at Austin
Sent from my iPhone

Begin forwarded message:

From: Milind Deo <milind.deo@utah.edu>
Date: August 27, 2017 at 10:40:22 PM CDT
To: "Olson, Jon" <jolson@austin.utexas.edu>
Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Jon:
Please find the evaluation attached. I have also provided my current CV. Thanks.

Regards, Milind

From: "Olson, Jon" <jolson@austin.utexas.edu>
Date: Tuesday, August 22, 2017 at 9:21 AM
To: "Milind.Deo@utah.edu" <milind.deo@utah.edu>
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Hi Milind – Thanks again for working on this. If you could get something to us by Monday that would be great. Below is the link to the papers. –Jon

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGSkMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Milind Deo [mailto:milind.deo@utah.edu]
Sent: Tuesday, August 22, 2017 10:05 AM
To: Olson, Jon <jolson@austin.utexas.edu>
Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

Jon:

I am working on this now. The research statement says five papers are attached – but I did not get the attachments. May I request you to please send me the papers? Thank you.

I apologize for the delay in getting this to you.

Regards, Milind

From: "Olson, Jon" <jolson@austin.utexas.edu>
Date: Monday, July 31, 2017 at 1:46 PM
To: "Milind.Deo@utah.edu" <milind.deo@utah.edu>
Cc: "Olson, Jon" <jolson@austin.utexas.edu>, "Stickney, Stephanie" <stickney@austin.utexas.edu>
Subject: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Milind – Thank you so much for your willingness to write a promotion assessment for us. I have attached a letter requesting your evaluation of the promotion dossier of Dr. Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

Thanks so much for your time and consideration.

-Jon

Link to significant papers:

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGskMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

MILIND DEO

Curriculum Vitae

Biography

Education

Honors & Awards

Biography

Affiliations

Geographical Regions
of Interest

Teaching

Research

Publications

Presentations

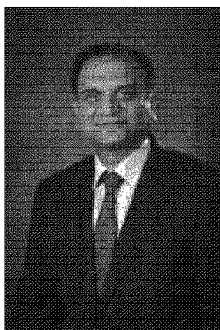
Graduate Students

Professional Organizations

Service

Contact Information

Login to Profiles



Professor, Chemical Engineering

Peter D. and Catherine R. Meldrum Professor, Chemical Engineering

Chair Department of Chemical Engineering

Email Milind.Deo@utah.edu

Phone +1 (801)581-7629

Assistant BUSHMAN, CHRISTINA MARIE

Email: christina@chemeng.utah.edu Phone: 801/581-6915

[More Contact Info](#)

Biography

Education

- B.Tech, Chemical Engineering, Indian Institute of Technology
- Ph.D., Chemical Engineering, University of Houston. Project: Residual Saturations in Carbon Dioxide Enhanced Oil Recovery

Honors & Awards

- Distinguished Lecturer. Society of Petroleum Engineers, 09/2016
- Top 15% in Teaching CH EN 6185. University of Utah - College of Engineering, 05/2015
- Awarded the Peter D. and Catherine R. Professorship. University of Utah - College of Engineering, 05/2015
- Top 15% in the college for CH EN 6185 Reservoir Engineering for Spring 2014. College of Engineering, 06/2014
- Fellow. American Institute of Chemical Engineers, 07/2012
- Distinguished Service in the Area of Reservoir Characterization and Dynamics, Regional Rocky-Mountain Award. Society of Petroleum Engineers International, 09/09/2010

Biography

Post-doctoral Fellow, Department of Petroleum Engineering, Stanford University, Stanford, CA, 1987-1989.

Affiliations

- American Institute of Chemical Engineers (AIChE), Senior Member, 06/01/1990 - present
- American Chemical Society (ACS), Member, 06/01/1990 - present
- Society of Petroleum Engineers (SPE), Member, Faculty Advisor - Student Chapter, 08/01/1987 - present

Geographical Regions of Interest

- India

C



University of Pittsburgh

Swanson School of Engineering
Department of Chemical and Petroleum Engineering

940 Benedum Hall
 3700 O'Hara Street
 Pittsburgh, PA 15261
 412-624-9830
 Fax: 412-624-9639
 che@engr.pitt.edu
 www.cpe.pitt.edu

Dr. Jon Olson
 Chairman and Frank W. Jessen Professor
 The Lois and Richard D. Folger Leadership Chair
 Petroleum and Geosystems Engineering
 Univ of Texas at Austin

8-7-17

Dr. Olson:

It is my pleasure to provide you with a very strong letter of recommendation for Professor Ryosuke Okuno for tenure and for advancement in rank to the position of Associate Professor in the Department of Petroleum & Geosystems Engineering at The University of Texas at Austin. I was chair of our school's tenure committee for six years and I am still on the committee as a representative of the chemical and petroleum engineering department. Therefore I am familiar with the importance of reference letters, especially regarding Dr. Okuno's impact, standing, leadership, and potential. I do not believe that I have ever met Dr. Okuno, although I am familiar with his work because of the overlap between his areas of research with mine, including high pressure phase behavior, high pressure viscosity, CO₂ EOR, and first-contact miscible EOR with light alkanes.

Dr. Okuno is one of the few engineers who routinely tackles very difficult multi-phase problems, most notably the combination of multiple phase equilibria along with the modeling of the flow of these multiple phases in porous media. Many years ago I worked on a four fluid phase equilibrium flash algorithm for water-oil-CO₂-rich liquid and vapor; it was almost the death of me. Because of the level of difficulty in developing robust algorithms for multiple fluid phase behavior in multi-component mixtures, there are very few solid, meaningful, useful papers on this topic; I have found Dr. Okuno's work to be outstanding in this regard, particularly his 2010 paper regarding robust three-phase flashes with a reduced method. His 2011 paper regarding low temperature CO₂ flooding was particularly insightful in that it explained how both vaporizing and condensing mechanisms were responsible for excellent oil recovery; I have incorporated these findings into my CO₂ EOR class at Pitt. Dr. Okuno's 2015 paper on the direct perturbation of the PR attractive and co-volume pseudo-component parameters for reservoir fluid characterization was an impressive and clever paper and will likely end up being one of his more impactful for modelers.

With respect to his overall dossier from Univ of Alberta and UT Austin, Dr. Okuno certainly merits promotion. He has established a well regarded research effort involving complex phase behavior and fluid flow aspects of multi-component multiple phase systems relevant to EOR. He has garnered a respectable and significant amount of funding from a steady stream of numerous relatively small awards that have allowed him to maintain a vibrant research program. He has developed an impressive phase behavior and transport property lab. He has established himself as an expert in practical equation of state concepts for modeling phase behavior related to oil, heavy oil and bitumen EOR. He has given a large number of presentations. He has supervised a PhD to completion and has two nearing completion in Alberta and is advising three more at UT Austin and is co-advising a fourth with Dr. Pope. He is collaborating with other outstanding senior faculty and is obviously a meaningful contributor to these joint efforts. He has published his findings in numerous well-written and highly detailed papers. He has already attained an h-index of 11 and more importantly, I find that his publications are both insightful and useful and likely to continue making a meaningful impact for reservoir modelers. He is working as PI on two industrial affiliate programs, and he is active in SPE. Dr. Okuno has made a wise decision to remain engaged in both challenging experimental work related to difficult EOR technologies along with meaningful and useful modeling strategies that should serve his program and the department well for many years. I fully support his promotion to Associate Professor with tenure.

Sincerely

Dr. Robert Enick
 Covestro Professor of Chemical and Petroleum Engineering
 University of Pittsburgh

Brooks, Allison B

From: Stickney, Stephanie
Sent: Friday, September 15, 2017 11:54 AM
To: Brooks, Allison B
Subject: FW: Promotion Letter Request, Ryosuke Okuno, University of Texas
Attachments: Okuno letter.pdf; ATT00001.htm

From: <Olson>, Jon Olson
Date: Tuesday, August 8, 2017 at 10:53 AM
To: Stickney
Subject: Fwd: Promotion Letter Request, Ryosuke Okuno, University of Texas

fyi.

Jon E. Olson, Chairman and Professor
Petroleum & Geosystems Engineering
The University of Texas at Austin
Sent from my iPhone

Begin forwarded message:

From: "Enick, Robert M" <rme@pitt.edu>
Date: August 8, 2017 at 10:08:42 AM CDT
To: "Olson, Jon" <jolson@austin.utexas.edu>
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

I hope this is OK

Bob

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]
Sent: Wednesday, August 02, 2017 5:12 PM
To: Enick, Robert M
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

good luck!

Jon E. Olson
Chair and Professor, Petroleum and Geosystems Engineering
512-471-7375

From: Enick, Robert M [<mailto:rme@pitt.edu>]
Sent: Wednesday, August 02, 2017 4:10 PM
To: Olson, Jon
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

My Topic 1 well person backed out..I was writing a waterless fracking proposal...
So I am now doing a "small" Topic 3 on wellbore integrity

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]
Sent: Wednesday, August 02, 2017 5:09 PM
To: Enick, Robert M
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Yes it is! Area 1A. I imagine there will be a large number of proposals.

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Enick, Robert M [<mailto:rme@pitt.edu>]
Sent: Wednesday, August 02, 2017 3:59 PM
To: Olson, Jon <jolson@austin.utexas.edu>
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Is it **“Advanced Technology Solutions for Unconventional Oil & Gas Development”**

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]
Sent: Wednesday, August 02, 2017 4:59 PM
To: Enick, Robert M
Cc: Stickney, Stephanie
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Thanks. I am working on a NETL proposal as well. Major time sink!

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Enick, Robert M [<mailto:rme@pitt.edu>]
Sent: Wednesday, August 02, 2017 3:58 PM
To: Olson, Jon <jolson@austin.utexas.edu>
Cc: Stickney, Stephanie <stickney@austin.utexas.edu>
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

SORRY

I will do it Monday or Tuesday

PROMISE

Working on NETL proposal till friday

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]
Sent: Wednesday, August 02, 2017 4:57 PM

To: Enick, Robert M
Cc: Stickney, Stephanie
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas
Importance: High

Hi Robert – I am checking in to see if you still have this promotion letter on your to-do list? If we could get something in the next week, that would be great. Let me know. Thanks. -Jon

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Olson, Jon
Sent: Thursday, June 29, 2017 2:03 PM
To: 'rme@pitt.edu' <rme@pitt.edu>
Cc: Olson, Jon <jolson@austin.utexas.edu>; Stickney, Stephanie <stickney@austin.utexas.edu>
Subject: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Robert - I have attached a letter requesting you to evaluate the promotion dossier of one of our assistant professors, Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Please respond to this email as soon as is convenient as to whether you can do this evaluation. Assuming you are willing to participate, the deadline we are requesting for receiving your letter is July 17.

Thanks so much for your time and consideration.

-Jon

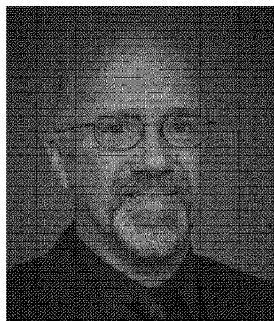
Link to significant papers:
https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGskMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

ENICK, ROBERT M

Chem/Petroleum Engineering

**ENICK, ROBERT M**

NETL ORISE FACULTY FELLOW
COVESTRO PROFESSOR AND VICE CHAIR
FOR RESEARCH

FACULTY

PROFESSOR

Office: 807 Benedum Hall

O: 412-624-9649

F: 412-624-9639

rme@pitt.edu

— EDUCATION & TRAINING

Ph.D. in Chemical Engineering, University of Pittsburgh, 1985

Postdoctoral Training in Chemical Engineering Department, , 1985

M.S. in Chemical Engineering, University of Pittsburgh, 1983

M.S. in Petroleum Engineering, University of Pittsburgh, 1983

B.S. in Chemical Engineering, Petroleum Option, University of Pittsburgh, 1980

— RESEARCH INTERESTSCO₂ enhanced oil recoveryDesign of CO₂ soluble surfactants, polymers and thickeners

High pressure phase behavior

High temperature high pressure viscometry

Pre- and post-combustion CO₂ capture solvent design

Supercritical fluid extraction of impurities

— AWARDS & HONORS

(2014) SSOE Board of Visitors Award.

(2013) Carnegie Science Center Award Environmental Award, for work on Phase Changing Solvents for CO₂ capture with GE Global.

(2011) Chemical Engineering Faculty Honor Roll Award.

(2011) Secretary's Achievement Honor Award, the highest internal non-monetary recognition given to DOE employees and contractors from the US Secretary of Energy Chyu for providing exceptional service to the Department and the American people.

(2011) Secretary's Achievement Honor Award: Dr. Enick, along with the other team members, received the Secretary's Achievement Honor Award; the highest internal non-monetary recognition given to DOE employees and contractors from the US Secretary of Energy for p.

(2010) Chemical Engineering Faculty Honor Roll Award.

(2010) Department of Energy, NETL Department of Energy, Regional University Alliance Faculty Fellow.

(2009) Presidential Green Chemistry Challenge Academic Award, Dr. Beckman Awardee, Dr. Enick, T. Styrenic, D. Sarbu team members, Bayer Professor.

(2007) Chemical Engineering Faculty Honor Roll Award.

(2007) Department of Energy, NETL Institute for Advanced Energy Solutions, Resident Institute Fellow.

(2006) Presidential Green Chemistry Challenge Academic Award, Dr. Beckman Awardee, Dr. Enick, T. Styrenic, D. Sarbu team members, Bayer Professor.

(2005) Chemical Engineering Faculty Honor Roll Award.

(2004) James T. MacLeod Professorship.

(2002) Chemical Engineering Faculty Honor Roll Award.

(2002) Presidential Green Chemistry Challenge Academic Award, Dr. Beckman Awardee, Dr. Enick, T. Styrenic, D. Sarbu team members, Bayer Professor.

(2001) Chemical Engineering Faculty Honor Roll Award.

(2001) School of Engineering Board of Visitors Award.

(2000) Carnegie Science Center Award for Excellence in Teaching Technology, with Dr. Russell and John Murphy.

(2000) James T. MacLeod Professorship.

(2000) R&D 100 Nomination for 2000, Mint Seal Products.

(1999) AspenTech Award for University Teaching Excellence.

(1998) Chancellor's Distinguished Teaching Award.

(1998) Commendation from Vice Chancellor on Student Mentoring.

(1998) James T. MacLeod Teaching Fellow, School of Engineering.

(1996) Beltle-Vestri Teaching Award for the School of Engineering.

(1996) Commendation from Vice Chancellor on Student Mentoring.

(1996) MacLeod Teaching Fellow, School of Engineering.

(1996) Outstanding Professor, Undergraduate Classes, Chemical Engineering.

(1995) B.P. America Faculty Fellow.

(1995) Outstanding Professor, Undergraduate Classes, Chemical Engineering.

(1991) William Kepler Whiteford Faculty Fellow.

(1988) James T. MacLeod Faculty Fellowship.

(1987) Lilly Teaching Fellowship, University of Pittsburgh.

(1984) Coull Award, Outstanding Graduate Student, Chemical Engineering Department.

(1984) SPE Region IX Graduate Teaching Fellowship.

(1983) SPE Region IX Graduate Teaching Fellowship.

(1982) Exxon Teaching Fellowship.

(1980) Outstanding Senior, Chemical Engineering.

+ PUBLICATIONS

+ PRESENTATIONS

- PATENTS

Enick, R.M., 1990, "CO₂ Gels and Methods of Making," 4,921,635.

Enick, R.M., 2001, "Method and Composition for Surface-Treatment of Metals," 6,138,815.

Enick, R.M., 2001, "System for recovery of metals from solutions thereof," 6,241,807.

BC



Mork Family Department of
Chemical Engineering and Materials Science

August 20, 2017
Professor Jon E. Olson,
Chair and Frank W. Jessen Professor
The Lois and Richard D. Folger Leadership Chair
Department of Petroleum Engineering
University of Texas, Austin TX

Dear Dr. Olson:

Thank you for inviting my input for the promotion case of Dr. Ryosuke Okuno to the rank of associate professor of Petroleum Engineering at University of Texas, in Austin, Texas. For the record, as a member of NAE, I am currently the Omar B. Milligan Professor and the Director of the Petroleum Engineering Program at the University of Southern California. I also serve as the Executive Director of CiSoft, a Research Center sponsored by Chevron on smart oilfield technologies and as the Executive Director of UKC at USC. My areas of expertise are on reservoir characterization, displacement processes and fractured reservoir modeling.

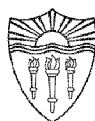
To start, I should mention that I have not yet had the chance to personally meet Dr. Okunu but I am aware of his creative contributions to the literature in the areas of phase behavior modeling as well as his outstanding technical editor services to the society of Petroleum Engineers.

His original research work at University of Alberta contributed to new understanding about recovery processes involving steam solvent and SAGD. Years ago, we did some work on steam solvent stimulation more from the standpoint of process modeling. But I am glad he has contributed real valuable experimental data to examine the merits of the process. He is a welcome addition to the rank of researchers at U.S. Petroleum Engineering Departments because of his interest and contributions in both experimental work and numerical modeling and particularly focusing on thermodynamics of water-hydrocarbon mixtures.

He has been quite productive and generating great contributions to the literature with even M.S. level students at University of Alberta. While at UT, his level of efforts in raising research funding and supervising research has been outstanding and he is active in inspiring graduate students.

The recognition he has received from SPE with the Junior faculty research award is indicative of his originality and creative abilities. His focus area is important for training a new generation of engineering scientists who can tackle issues related to enhancing recovery from heavy oil resources.

University of Southern California
825 Bloom Walk, Los Angeles, California 90089-1211 • Tel: 213 740 0321 • Fax: 213 740 1077



I am pleased to recommend his promotion to the rank of associate professor in petroleum engineering at UT.

If you have any questions, please let me know.

Sincerely,

A handwritten signature in black ink, appearing to read 'Iraj Ershaghi', with a stylized, cursive script.

Iraj Ershaghi, Ph.D., P.E.
Omar B. Milligan Professor and Director
Petroleum Engineering Program
Mork Family Department of Chemical Engineering and Materials Science
Co-Executive Director of CiSoft

Tuesday, September 5, 2017 at 9:43:13 AM Central Daylight Time

Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas
Date: Monday, August 21, 2017 at 11:59:50 AM Central Daylight Time
From: Stickney, Stephanie
To: Iraj Ershaghi, Olson, Jon
CC: Stickney, Stephanie
Priority: High

Hi Iraj,

Thank you for sending in your reference letter. We also need C.V.s of letter writers.

Can you please send me your C.V.?

Thank you very much,

STEPHANIE STICKNEY, Executive Assistant
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-1210 | www.pge.utexas.edu

From: Iraj Ershaghi
Date: Sunday, August 20, 2017 at 9:55 AM
To: Jon Olson
Cc: Stickney
Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dr. Olson:

I am attaching my letter on the promotion of Dr. Okuno
If you have any further questions, please let me know.

Iraj Ershaghi, Ph.D., P.E.
Omar B. Milligan Professor and Director
Petroleum Engineering Program
Executive Director of CISOft
Executive Director of UKC
Mork Family Department of Chemical Engineering and Materials Science
Viterbi School of Engineering
University of Southern California
925 Bloomwalk
Los Angeles, CA 90089-1211 USA
(310) 991-1337

From: Iraj Ershaghi
Sent: Thursday, June 29, 2017 1:48:22 PM
To: Olson, Jon
Cc: Stickney, Stephanie
Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

yes that i better.

Iraj Ershaghi

Page 1 of 3

From: Olson, Jon <jolson@austin.utexas.edu>
Sent: Thursday, June 29, 2017 1:34:24 PM
To: Iraj Ershaghi
Cc: Stickney, Stephanie
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Iraj – Thanks for your quick response. We would still like to get a letter from you, so we would like to try to accommodate your time constraints. Can you get something to us by Monday, August 7? Thanks. -Jon

Hook ‘em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Iraj Ershaghi [<mailto:ershaghi@usc.edu>]
Sent: Thursday, June 29, 2017 2:07 PM
To: Olson, Jon <jolson@austin.utexas.edu>
Cc: Stickney, Stephanie <stickney@austin.utexas.edu>
Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

Jon

I cannot focus on this until August 1st.

Iraj Ershaghi, Ph.D., P.E.
Omar B. Milligan Professor and Director
Petroleum Engineering Program
Executive Director of CiSoft
Executive Director of UKC
Mork Family Department of Chemical Engineering and Materials Science
Viterbi School of Engineering
University of Southern California
925 Bloomwalk
Los Angeles, CA 90089-1211 USA
(310) 991-1337

From: Olson, Jon <jolson@austin.utexas.edu>
Sent: Thursday, June 29, 2017 11:54:20 AM
To: Iraj Ershaghi
Cc: Olson, Jon; Stickney, Stephanie
Subject: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Iraj - I have attached a letter requesting you to evaluate the promotion dossier of one of our assistant professors, Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help again this year – I greatly appreciate your letter from last year for Dr. Quoc Nguyen, who was successfully promoted.

Please respond to this email as soon as is convenient as to whether you can do this evaluation. Assuming you are willing to participate, the deadline we are requesting for receiving your letter is July 17.

Thanks so much for your time and consideration.

-Jon

Link to significant papers:

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGSkMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor

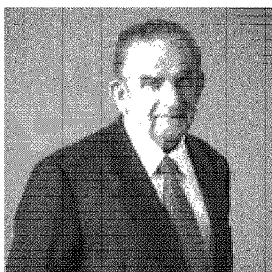
Lois K. and Richard D. Folger Leadership Chair

The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu



Viterbi Faculty Directory

Iraj Ershaghi



Omar B. Milligan Professor, Director Of Petroleum Engineering Program, Executive Director Of Cisoft, And Executive Director Of Ukc

Education

- 1972, PhD, Petroleum Engineering, University of Southern California
- 1968, Masters, Petroleum Engineering, University of Southern California
- 1965, Bachelors, Petroleum Engineering, Univ of Tehran

Biography

Ph.D., Petroleum Engineering, University of Southern California, 1972

M.S., Petroleum Engineering, University of Southern California, 1968

B.S., Petroleum Engineering, University of Tehran, Iran, 1965

A graduate of University of Tehran and USC, Iraj Ershaghi is the Omar B. Milligan Professor and Director of the Petroleum Engineering Program at USC. He is also serving as the Executive Director of CiSoft and the Executive Director of UKC Education Research Center. His research areas include well test modeling of complex naturally fractured reservoirs, pattern recognition techniques for monitoring water floods and EOR processes, reservoir characterization, unconventional resources, properties of geothermal brines and soft computing in Smart Digital Oilfield design and operations. Awards and recognition by various institutions and professional societies include: USC School of Engineering, Distinguished Service and Senior research Awards, Outstanding Educator Award OCCE; SPE's Distinguished Service Award; Technology Transfer Award for Development of the Smart Oilfield Technology Curriculum; North America Western Region, Reservoir Description and Dynamics Award, International John Franklin Carlil Award and the SPE/AIME Honorary Member Medal. He served on the National Board of Directors of RPSEA. In 2014 was Inducted into the U S National Academy of Engineers

He worked for SIRIP, Signal Oil and Gas, CA State Lands Commission, U S Dept. of Justice, U S Dept. of Interior, Chemical Research Laboratories McFarland Energy, National Bureau of Standards and many others.

Research Summary

* Smart Oilfield Technologies

- * Naturally Fractured Reservoirs
- * Pressure Transient Modeling
- * Reservoir Characterization and Compartmentalized Systems

Production Geology

Simulations of transport processes in complex geological structure require detailed microlamination studies and inter-flow unit characterization. Synergistic approaches to combine signals from pressure transients and performance data for correlation of geological markers are being developed. Heterogeneities in subterranean reservoirs associated with faults need to be characterized. Multiple interference tests can potentially provide a significant insight into lateral and vertical communications. Predictive models are being developed to examine the impact of fault zones in terms of their transmissivities on pressure transient tests. Various conceptual models should be scrutinized to minimize the non-uniqueness of the predictive process.

Fractured Reservoirs

Multi-phase flow and pressure transient response characteristics of complex fractured rocks are being investigated. Improvements for scale-up processes of laboratory-derived pseudo-properties to large scale networks of fracture are being developed. Process related recovery issues are examined for systems exhibiting multiple porosity behaviors. Interporosity characteristics of tight rocks are being examined for various system properties. Predictive techniques are being developed for recovery processes in fractured systems under the influence of steam, solvent, and low tension floods.

Well Productivity Improvement

Studies are underway to develop effective methods for augmenting lift mechanisms in low pressure reservoirs. Initial studies are focused on low pressure gas reservoirs as affected by liquid loading.

Integrated Asset Mangement

Collaborative studies are underway addressing the issues related to data mining of massive data from continuously recorded sensors, asset component definition and diagnostics for detection of reservoir flow units.

Awards

- 1983 Society of Petroleum Engineers Distinguished Faculty Award
- 1983 Tau Beta Pi Teaching Award
- 1996 Society of Petroleum Engineers Distinguished Member Award
- 1996 Fellow of Professional Society
- 1996 Endow Chaired Professorship
- 1996 USC School of Engineering Distinguished Service Award
- 2000 Fellow of Professional Society
- 2002 Fellow Institute for Advancement of Engineering
- 2003 Orange Council of Engineers and Scientist Outstanding Educator Award
- 2003 American Association for Advancement of Engineering Outstanding Educator Award
- 2003 Foreign Academy Affiliation
- 2005 Society of Petroleum Engineers Western North America Distinguished Service Award
- 2006 Society of Petroleum Engineers Technology Transfer Award for Development of the Smart Oilfield Technology Curriculum
- 2007 Society of Petroleum Engineers Reservoir Description and Dynamics
- 2010 Society of Petroleum Engineers John Franklin Carll Award
- 2010 USC Viterbi School of Engineering Viterbi Service Award
- 2012 AIME-SPE Honorary Member AIME-SPE
- 2014 USC Viterbi School Senior Researcher Award
- 2014 National Academy of Engineering Member

Departments

- Mork Family Department of Chemical Engineering and Materials Science

Office

- HED 316
- Hedco Petroleum and Chemical Engineering Building
- 925 Bloom Walk, Los Angeles, CA 90089
- USC Mail Code: 1211

Phone

- (213) 740-0321

Email

- ershaghi@usc.edu

[Research Website](#)

[Publications](#)

[Return to Faculty Directory](#)



PennState

Turgay Ertekin
 Professor Emeritus of Petroleum and
 Natural Gas Engineering
 John and Willie Leone Family Department
 of Energy and Mineral Engineering
 The Pennsylvania State University
 158 Hosler Building
 University Park, PA 16802

814-865-6082
 eur@psu.edu

July 12, 2017

Professor Jon E. Olson
Chairman and Frank W. Jessen Professor
The Lois and Richard D. Folger Leadership Chair
Department of Petroleum and Geosystems Engineering
The University of Texas at Austin
CPE 2.502
Austin TX, 78712

RE: Dr. Ryosuke Okuno's Promotion to Associate Professor and Tenure Proceedings

Dear Professor Olson,

I am pleased to provide this letter as a part of Dr. Ryosuke Okuno's promotion to Associate Professor and Tenure in the Department of Petroleum and Geosystems Engineering at The University of Texas at Austin. As you will see, I am supporting Dr. Okuno's promotion to Associate Professor with tenure enthusiastically and with no reservation. In my evaluation, I am focusing only on the scientific experiences of Dr. Okuno not only in the area of petroleum engineering technology but also his expertise in inter-connectivity of subsurface systems. In putting this evaluation letter together I have used Dr. Okuno's curriculum vitae, his statement describing his overall research strategies as well as his six sample publications that you have forwarded to my attention. I have never met Dr. Okuno but I am familiar with some of his publications.

Dr. Okuno's B.E. and M.E. degrees in Geosystem Engineering coupled with his Ph.D in Petroleum Engineering make him a multi-faceted scientist. Also, his prior experience in two different academic institutions as a researcher and his work experience in industrial settings in Japan, Canada and Texas places him on a platform where he can comfortably implement his multi-dimensional technical knowledge and experience on a wide spectrum of issues that are being faced especially in reservoir and production engineering. From his publications, I see Dr. Okuno as an experimentalist in the area of thermodynamics of systems in EOR applications with more emphasis on solvent based applications for bitumen recovery. This is an area that typically requires extensive knowledge on physical chemistry of surfaces and creative coupling of such properties to description of the relevant transport problems in porous media. Dr. Okuno is one of the few scientists and academicians who currently explore the potentials of bitumen extraction using solvents as most of the current work in this area has been focusing on the extraction process that uses steam. The novelty of Dr. Okuno's work lies in the suggested dynamic control of the operational parameters for the process during the implementation phase. Beyond his experimental work I also find Dr. Okuno as equally competent and comfortable in formulating some complex phase behavior problems that surface at the macroscopic and microscopic levels. In other words, Dr. Okuno's experimental work and his strong theoretical background in thermodynamics and interfacial mass transfer, complement each other effectively in a symbiotic manner. With his experience and expertise, Dr. Okuno is quite uniquely poised to address some of the fundamental problems of enhance oil recovery which is a critically important topic in the success of the petroleum industry both in unconventional and conventional reservoir systems. I am confident that Dr. Okuno's research efforts and publications with his students and his contributions in the area of enhanced oil recovery technologies in increasingly complex domains have the potential of effectively increasing the ability of other scientific experts and engineers in advancing their own work. I find the papers that Dr. Okuno has generated together with his

students as thought provoking as they appeared in the top-tier journals of the petroleum engineering science and technology. In view of his publications in high-impact journals and the good level of research funding Dr. Okuno has been able to generate, my overall rating of his research efforts is very good.

In closing, I would like to state that a review of research component of Dr Okunos's application package, tells me that Dr. Okuno has never rested on his oars as he continued to maintain high levels of effectiveness and productivity in the academic and scientific worlds of petroleum engineering technologies. His rather rich industrial and academic experiences, when coupled together, clearly indicates that Dr. Okuno's work is competent and admirably collaborative and forceful towards generating new questions and answers. This is where I find Dr. Okuno's research work abundantly thought provocative, as he has been pushing the limits of the knowledge envelope in challenging and rather abstract quarters of enhanced oil recovery related developments. In view of all of these perspectives that are presented in this review statement, I feel comfortable in stating that Dr. Okuno possesses the best qualities of a scientist and a research leader and a responsible citizen of petroleum engineering technologies.

In our universities, a faculty member's contributions are reviewed within a tripartite-mission framework, namely, teaching, research and service. However, I was asked that in my evaluations I should only focus on Dr. Okuno's scholarly distinction. Accordingly, I have no qualm in stating that Dr. Okuno, with no doubt, excelled in research. I am comfortable in stating that, Dr. Ryosuke Okuno from the perspective of his research accomplishments is a deserving candidate to be appointed as an associate professor as he would have been here at Penn State if he were put up for promotion and tenure.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'Turgay Ertekin', with a stylized, cursive script.

Turgay Ertekin
Professor Emeritus
Petroleum and Natural Gas Engineering

Brooks, Allison B

From: Stickney, Stephanie
Sent: Friday, September 15, 2017 11:54 AM
To: Brooks, Allison B
Subject: FW: Promotion Letter Request, Ryosuke Okuno, University of Texas
Attachments: image001.png; Ertekin_Short_cv_2017.pdf; Ertekin_Long_cv_2017.pdf

From: Turgay Ertekin
Date: Friday, July 21, 2017 at 5:45 PM
To: Stickney
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Hi Stephanie,

I have attached a short version and a long version of my , please use the one that you think as more fitting.

Best,
Turgay

From: Stickney, Stephanie [<mailto:stickney@austin.utexas.edu>]
Sent: Friday, July 21, 2017 4:14 PM
To: Turgay Ertekin <eur@psu.edu>
Cc: Olson, Jon <jolson@austin.utexas.edu>; Stickney, Stephanie <stickney@austin.utexas.edu>
Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

Hi Turgay,

Thank you very much for your letter of recommendation. As part of the promotion process we need the C.V.s of the letter writers. Could you please send me your C.V. at your earliest convenience?

Gratefully,

STEPHANIE STICKNEY, Executive Assistant

The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-1210 | www.pge.utexas.edu

From: Turgay Ertekin [<mailto:eur@psu.edu>]
Sent: Tuesday, July 11, 2017 1:45 PM
To: Olson, Jon <jolson@austin.utexas.edu>
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Jon,

Please find the attached evaluation letter that I assembled for Dr. Rysouke Okuno. I hope that you will find my views helpful.

All the best,

Turgay

Turgay Ertekin

Professor Emeritus of Petroleum and Natural Gas Engineering



PennState

158 Hosler Building

University Park, PA 16802 USA

Telephone: 814 865 6082

e-mail: eur@psu.edu

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]

Sent: Thursday, June 29, 2017 3:10 PM

To: Turgay Ertekin <eur@psu.edu>

Cc: Olson, Jon <jolson@austin.utexas.edu>; Stickney, Stephanie <stickney@austin.utexas.edu>

Subject: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Turgay - I have attached a letter requesting you to evaluate the promotion dossier of one of our assistant professors, Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Please respond to this email as soon as is convenient as to whether you can do this evaluation. Assuming you are willing to participate, the deadline we are requesting for receiving your letter is July 17.

Thanks so much for your time and consideration.

-Jon

Link to significant papers:

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svG5kMVJ2CPN2tkhT_Ea?dl=0

PS I hear you are stepping down from chair this year. Congratulations on a great career leading your department at PSU. Sanjay has big shoes to fill!

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor

Lois K. and Richard D. Folger Leadership Chair

The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

TURGAY ERTEKIN, B. Sc, M. Sc., Ph. D.

PROFESSOR EMERITUS OF PETROLEUM AND NATURAL GAS ENGINEERING
158 HOSLER BUILDING, UNIVERSITY PARK, PA 16802 USA

Tel: 814 - 865 - 6082

Mobile: 814 - 883 - 7584

Fax: 814 - 863 - 5709

e-mail: eur@psu.edu

Professor of Petroleum and Natural Gas Engineering
George E. Trimble Chair in Earth and Mineral Sciences
Co-Director of the Institute for Natural Gas Research (INGaR) at Penn State

EDUCATION

Ph.D. 1978 Penn State U., University Park, PA (Petroleum and Natural Gas Engineering)
M.Sc. 1971 Middle East Technical U., Ankara, Turkey (Petroleum Engineering)
B.Sc. 1969 Middle East Technical U., Ankara, Turkey (Petroleum Engineering)

ACADEMIC POSITIONS

2017 - Professor Emeritus of Petroleum and Natural Gas Engineering, PennState U.
1978-2017 Faculty Member, Petroleum and Natural Gas Engineering, Penn State U.
Assistant Professor (1978-1983), Associate Professor (1983-1987),
Professor (1987-2017), Section Chairman (1984-1998), Associate Department Head (1998-
2001), Professor and George E. Trimble Chair (2001-2017), Program Chairman (2002-
2015), Department Head (2013 - 2017), Member of the Graduate faculty (1978 - 2017)
1975-1978 Research and Teaching Assistant, Petroleum and Natural Gas Engineering, Penn State U.
Ph.D. candidate (1975-1978)
1970-1975 Faculty Member, Petroleum Engineering, Middle East Technical U.
Research Assistant (1970-1974), Instructor (1974-1975)

ACADEMIC AND SCIENTIFIC PROFILE

Turgay Ertekin has had extensive experience with the development and application of fluid flow models in porous media. He has been deeply involved in the mathematical modeling of flow problems using various techniques for 40 years. He has taught courses in fluid flow dynamics in porous media at the graduate and undergraduate levels and has directed the research work of graduate students on reservoir modeling and reservoir engineering. His research efforts with his graduate students have produced 51 Ph.D. and 107 M.S. theses, while 5 M.S. and 5 Ph.D. students' research works are still in progress. His current research deals with the flow of gases in tight formations, coal seam degasification process, well test analysis for composite reservoirs, enhanced oil recovery techniques, and artificial neural network applications in petroleum and natural gas engineering. Ertekin has developed several multiphase, compositional, multidimensional isothermal and nonisothermal numerical flow models that simulate the performance and applicability of some thermal and nonthermal recovery techniques in the petroleum reservoirs. Ertekin has given more than 300 invited lectures, paper presentations and seminars and more than 40 workshops and short courses throughout the world, and has authored or co-authored more than 250 publications including four books and four book chapters. Ertekin has served on the Society of Petroleum Engineers Editorial Board holding various positions including a two-year term as the Executive Editor of the *Formation Evaluation Journal*. Ertekin currently serves as an editor-in-chief for the *Journal of Petroleum Exploration and Production Technology*.

AWARDS AND HONORS

Pennsylvania State University, College of Earth and Mineral Sciences Matthew J. and Anne C. Wilson Outstanding Teaching Award (April 1982)
Quentin E. and Louise L. Wood Fellow in Petroleum & Natural Gas Engineering, Pennsylvania State University, College of Earth and Mineral Sciences (1990-2001)
Pennsylvania State University Graduate Faculty Teaching Award (April 1995)
Society of Petroleum Engineers Distinguished Achievement Award for Petroleum Engineering Faculty (September 1998)
Pennsylvania State University, College of Earth and Mineral Sciences Matthew J. and Anne C. Wilson Outstanding Service Award (May 1999)
Pennsylvania State University Twenty-Five Year Service Award (December 2000)
George E. Trimble Chair in Earth and Mineral Sciences, Pennsylvania State University (2001-)
Society of Petroleum Engineers Lester C. Uren Award for Distinguished Achievement in the Technology of Petroleum Engineering (October 2001)
Society of Petroleum Engineers Distinguished Member Award (October 2001)
Society of Petroleum Engineers Distinguished Lecturer (September 2004 – May 2005)
The Pennsylvania State University, College of Earth and Mineral Sciences Matthew J. and Anne C. Wilson Award for Excellence in Research (April 2004)
Society of Petroleum Engineers Publications Division “A Peer Apart” Award (November 2007)
Society of Petroleum Engineers Publications Division “Outstanding Associate Editor Award” (August 2008)
The Pennsylvania State University, College of Earth and Mineral Sciences “Faculty Mentoring Award” (April 2009)
The Russian Academy of Natural Sciences’ Nobel Laureate Physicist Kapitsa Gold Medal (September 2013)
Society of Petroleum Engineers Honorary Membership Award (October 2013)
American Institute of Mining Metallurgical and Petroleum Engineers Honorary Membership Award (Oct. 2013)

PROFESSIONAL SOCIETIES

Member, Society of Petroleum Engineers of AIME (1974-)
Member, Society of Industrial and Applied Mathematics (1984-)
Member, American Society for Engineering Education (1995-)
Member, Petroleum Society of CIM (2001-2012)

BC



**HAROLD VANCE DEPARTMENT OF
PETROLEUM ENGINEERING**
TEXAS A & M UNIVERSITY

W. John Lee
Rob L. Adams '40 Professor
(979) 845-2208
john-lee@tamu.edu

16 August 2017

Dr. Jon E. Olson
Chairman and Frank W. Jessen Professor
Department of Petroleum and Geosystems Engineering
The University of Texas at Austin

Re: Promotion and Tenure Application, Dr. Ryosuke Okuno

Dear Dr. Olson,

My review of Dr. Ryosuke Okuno's recent peer-reviewed publications, placed into context by his curriculum vitae and statement on research, have provided convincing evidence to me that he is highly qualified for tenure and promotion to the rank of Associate Professor. The reasons for my conclusions follow.

I do not know Dr. Okuno, nor do I work in exactly the same area as that of his research focus. Nevertheless, given my educational background in Chemical Engineering and my long-standing interest in enhanced recovery of liquid and solid (bitumen) petroleum, I believe that I am qualified to comment meaningfully on his scholarly achievements.

His 2016 paper, "An Experimental Study of Multiphase Behavior for n-Butane/Bitumen/Water Mixtures," is especially noteworthy because it was published in the Society of Petroleum Engineers' most prestigious journal, the *SPE Journal*. This paper provides important experimental data that will assist enhanced recovery designers in planning improved steam-assisted gravity drainage projects for bitumen recovery, significant because the potential ultimate bitumen reserves in Canada are comparable to the more conventional liquid petroleum reserves in Saudi Arabia.

Perhaps of more general and fundamental interest is Dr. Okuno's 2015 paper published in Chemical Engineering Science, "Direct perturbation of the Peng-Robinson attraction and covolume parameters for reservoir fluid characterization." The computational algorithm presented in this paper reliably characterizes a wide variety of reservoir fluids, and should have important impact on continued progress in reservoir fluid characterization. Particularly striking is the fact that the methodology was successfully applied to 84 different reservoir fluids, including gas condensates, volatile oils, black oils, and heavy oils. Remarkable!

Dr. Okuno's plans for future research include objectives especially important to the petroleum industry: one focusing on ethane-based EOR and the other on improved recovery of tight oil. This latter area of is special interest to me because the challenges are so great and the potential rewards are so staggering. Given Dr. Okuno's expertise in PVT relationships in a wide range of petroleum fluids, he is ideally qualified to make progress in these frontier areas.

To summarize, I have concluded that Dr. Okuno's development at this stage of his career places him among the clear leaders among the younger scientists at research-intensive universities. Given his solid grounding in fundamental physics of reservoir fluids and his increasing variety of experimental and theoretical accomplishments, his potential for future professional growth and leadership appears to be excellent. He would certainly be promotable at Texas A&M. On this basis, I strongly recommend him for tenure and promotion at the University of Texas at Austin.

Respectfully,

Mailing Address:
3116 TAMU
College Station, TX 77843-3116
Web - <http://engineering.tamu.edu/petroleum>

Deliveries:
407 Richardson Building
College Station, TX 77843-3116
Tel. 979.845.2241 Fax 979.862.3666

Brooks, Allison B

From: Stickney, Stephanie
Sent: Friday, September 15, 2017 12:03 PM
To: Brooks, Allison B
Subject: FW: request for promotion letter
Attachments: Okuno (UT) T&P 08.16.17.docx; Lee John Short Bio TAMU 07 10 2015.docx

From: <Olson>, Jon Olson
Date: Wednesday, August 16, 2017 at 6:50 PM
To: Stickney
Subject: FW: request for promotion letter

FYI. Getting close!

Jon E. Olson
Chair and Professor, Petroleum and Geosystems Engineering
512-471-7375

From: Lee, W. John [<mailto:john-lee@tamu.edu>]
Sent: Wednesday, August 16, 2017 5:51 PM
To: Olson, Jon
Cc: Lee, W. John
Subject: RE: request for promotion letter

John,

A recommendation letter for Dr. Okuno is attached for your consideration. I have also attached a brief bio-sketch of me.

Regards,

John

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]
Sent: Wednesday, August 02, 2017 3:48 PM
To: Lee, W. John <john-lee@tamu.edu>
Cc: Olson, John <jolson@austin.utexas.edu>; Stickney, Stephanie <stickney@austin.utexas.edu>
Subject: request for promotion letter

Hi John – Thanks for your willingness to write a letter for us. The candidate is Dr. Ryosuke Okuno, who was an assistant professor at the University of Alberta before coming to Texas 2 years ago. His CV and research statement are attached, and below is a link to 5 significant papers. I have also included a formal letter request for you indicating in detail the kind of evaluation we would like you to make. Our main request of you is to compare Dr. Okuno's work to others in his field who are a similar stage in their academic career at research-intensive universities, and to comment on the significance of his research achievements. We are also interested to know if you would consider him promotable at A&M.

Please let me know if you have any other questions.

Thanks again for your help. I put August 20 in the letter, but if it is possible to get it earlier, that would be great. Regardless, I owe you a drink for all your help! I hope you enjoy your vacation.

-Jon

Link to significant papers:

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGskMVJ2CPN2tkhT_Ea?dl=0

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Peng, Ding-Yu [<mailto:dingyu.peng@usask.ca>]

Sent: Tuesday, August 01, 2017 4:20 PM

To: Olson, Jon <jolson@austin.utexas.edu>

Subject: RE: request for promotion letter

Dear Professor Olson:

Thank you for your message inviting me to serve as an external referee for an assistant professor who is being considered for promotion. I would be happy to accept this invitation provided that, in addition to the pertinent documents concerning the candidate, a document outlining the University of Texas at Austin's promotion standards could be made available to me.

With best regards,

Sincerely,

Ding-Yu Peng

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]

Sent: Saturday, July 29, 2017 4:27 PM

To: Peng, Ding-Yu

Subject: request for promotion letter

Hi Dr. Peng – I am the chair of petroleum engineering at the University of Texas at Austin. I have an assistant professor going up for promotion that specializes in PVT, EOR and reservoir engineering. Would you be willing to write a letter of evaluation of his research accomplishments? I would send you his CV, 5 significant papers and a research statement by the candidate. I would hope to get the letter back by August 15, but have some flexibility on that date.

If you are willing to consider this request, I will send you the details via email for your full consideration. I appreciate your time and consideration. I know letters are a big time commitment, but they are a crucial part of the academic promotion process, and a reference from someone of your stature would be highly regarded.

Best regards,

Jon

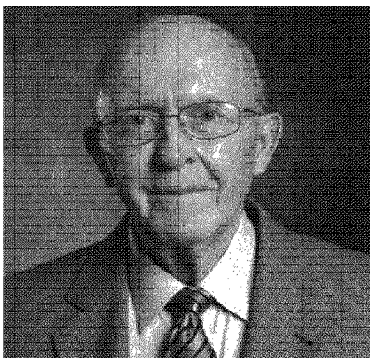
Jon E. Olson, Department Chair
Lois K. and Richard D. Folger Leadership Chair

Frank W. Jessen Professor
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

Biographical Information

W. John Lee

John Lee is Rob L. Adams Professor in Petroleum Engineering at Texas A&M University. John holds BS, MS and PhD degrees in chemical engineering from the Georgia Institute of Technology. He worked for ExxonMobil early in his career and specialized in integrated reservoir studies. He later joined the Petroleum Engineering faculty at Texas A&M, and became Regents Professor of Petroleum Engineering. While at A&M, he also served as a consultant with S.A. Holditch & Associates, where he specialized in reservoir engineering aspects of unconventional gas resources. He joined the University of Houston faculty in September 2011 and held the Cullen Distinguished University Chair until September 2015. He served as an Academic Engineering Fellow with the U.S. Securities & Exchange Commission (SEC) in Washington during 2007-8, and was a principal architect of the modernized SEC rules for reporting oil and gas reserves. John is the author of four textbooks published by SPE and has received numerous awards from SPE, including the Lucas Medal (the society's top technical award), the DeGolyer Distinguished Service Medal (the society's top service award) and Honorary Membership (the highest recognition awarded society members). He is a member of the U.S. National Academy of Engineering and the Russian Academy of Natural Sciences.



C

PENNSTATE



John and Willie Leone Family
Department of Energy and
Mineral Engineering

The Pennsylvania State University
110 Hosler Building
University Park, PA 16802

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EME@ems.psu.edu
www.emc.psu.edu/

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Mineral Engineering

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in Energy and
Sustainability Policy

Prof. Jon Olson
Chairman
Department of Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, Texas 78712

July 16th, 2017

Re: Assessment of Dr. Ryosuke Okuno's research credentials in support of his
tenure application

Dear Prof. Olson:

I am pleased to provide this letter indicating my strong support for Dr. Ryosuke Okuno's case for tenure. I currently hold the John and Willie Leone Family chair in Energy and Mineral Engineering at the Pennsylvania State University and am the head of the department. My specialization is in the research and development of Unconventional Resources and Integrated Reservoir Characterization. I hold a Ph.D. in petroleum engineering from Stanford University. Prior to coming to Penn State, I held the J. H. Herring Centennial Professorship in Petroleum Engineering at the Cockrell School of Engineering, University of Texas at Austin. I have known Dr. Okuno as a graduate student at UT Austin and later, after he joined the University of Alberta, I kept track of his impressive theoretical and experimental work related to phase behavior of solvent-bitumen mixtures. I supervised a team of students investigating the expanding solvent- steam assisted gravity drainage (ES-SAGD) process for recovery of hydrocarbon from Canadian heavy oil reservoirs. Dr. Okuno's research work was therefore very relevant to the research performed by my group. In the following, I would like to elaborate on Dr. Okuno's accomplishments as a top-notch researcher in the field of thermodynamics and phase behavior of complex hydrocarbon fluid mixtures.

College of Earth and Mineral Sciences

An Equal Opportunity University

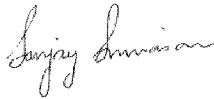
One of the key contributions of Dr. Okuno and his co-authors is a methodology for multiphase-fluid characterization that they term “Perturbation from n-alkanes”. In this method, the fluid components lumped together as the “plus” fraction are initially assigned critical temperature, pressure and acentric values equivalent to the nearest n-alkane in terms of carbon numbers. Then these initially assigned values are systematically perturbed in the direction of increasing aromaticity until a match to the observed pressure/temperature/volume data is achieved. In several papers, Dr. Okuno and his co-authors have tested the validity of this algorithm for various 3-phase mixtures. The development of this procedure is of immense significance for modeling the fluid behavior during complex recovery processes such as steam-solvent co-injection to recover heavy oils and bitumens. In such processes, there is a prevalence of three fluid phases – vapor (steam + solvent), liquid (mobilized oil) and the solvent-enriched oil phase close to the walls of the steam chamber. Incorrect representation of the solvent-enriched oil region can lead to erroneous estimation of oil recovery and the quantity of solvent required to maximize oil recovery. This key contribution by Dr. Okuno also has tremendous implication to the implementation of solvent injection processes for recovery of oil from conventional reservoirs.

In addition to the theoretical and algorithmic development summarized above, Dr. Okuno and his team have also performed several key laboratory experiments in order to investigate the pressure-volume-temperature and multiphase characteristics of solvent/hydrocarbon/water mixtures. They have performed these experiments at high pressures and high temperature conditions emulating in some cases, reservoir conditions. They use the experimental data to validate their models for multi-phase characteristics and also to derive some key inferences regarding the behavior of solvent/Athabasca bitumen/water mixtures. Their unique experiments reveal some important insights into the phase transitions that occur at the bitumen interface such as the appearance and disappearance of the vapor phase that is controlled by the presence or absence of water in the reservoir. Their experimental work for the first time revealed the existence of four co-existing phases for such mixtures at temperature and pressures similar to those encountered in Athabasca reservoir. The presence of a solvent-rich liquid phase, a bitumen-rich liquid phase, a vapor phase and a aqueous phase is predicted by Equation of State calculations but visual confirmation of these four phases in a laboratory experiment was not available until the experiments performed by Dr. Okuno and his team. These experiment results are again critical to predict the performance of the ES-SAGG recovery process for bitumen extraction.

Dr. Okuno’s publication record is excellent with several of publications in highly regarded journals such as Industrial & Engineering Chemistry Research, SPE Journal and Fluid Phase Equilibria. The number of publications that he has in rank and the quality of those publications would certainly place him in the upper echelon of faculty cases being considered for tenure at my current institution. His other research accomplishments such as the set-up of a premier laboratory facility for performing meticulous high pressure, high temperature PVT experiments using complex fluid mixtures, the initiation of an Ethane-based Enhanced Oil Recovery

research program that has already attracted a great many potential sponsors further solidify his case for tenure. I would like to conclude by stating that in my opinion, Dr. Okuno started his research career as an outstanding graduate researcher at UT Austin and has since, established himself as a leading researcher in the area of hydrocarbon thermodynamics. I see him evolving as a world-renowned scientist who combines experimental and theoretical research to solve many of the significant scientific challenges confronting humankind. I therefore strongly support his case for tenure at the University of Texas at Austin.
Thank you,

Sincerely,

A handwritten signature in cursive script, appearing to read "Sanjay Srinivasan".

Dr. Sanjay Srinivasan
Professor and John and Willie Leone Family Chair
Department of Energy and Mineral Engineering
The Pennsylvania State University
University Park, PA
sanjays@psu.edu
(814) 863 9470

Brooks, Allison B

From: Stickney, Stephanie
Sent: Friday, September 15, 2017 12:04 PM
To: Brooks, Allison B
Subject: FW: Letter for Ryosuke
Attachments: SanjaySrinivasan-CVBrief.doc; Ryosuke-letter-signed.pdf

From: <Olson>, Jon Olson
Date: Monday, July 17, 2017 at 5:32 PM
To: Stickney
Subject: FW: Letter for Ryosuke

FYI.

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

From: Sanjay Srinivasan [<mailto:sanjays@psu.edu>]
Sent: Monday, July 17, 2017 3:32 PM
To: Olson, Jon <jolson@austin.utexas.edu>
Subject: [UTEXAS: ATTACHMENT UNSCANNED] Letter for Ryosuke

Hello Jon:

Please find attached my letter in support of Ryosuke's case for tenure. Please let me know if you need anything else.

Best regards,

Sanjay

Sanjay Srinivasan
Professor
John and Willie Leone Family Chair
John and Willie Leone Family Department of Energy and Mineral Engineering
The Pennsylvania State University
206 Hosler Building
University Park, PA 16802
sanjays@psu.edu
814 863-9470

SANJAY SRINIVASAN**Professor and Head**

John and Willie Leone Family Chair

Phone: (814) 863-9470 (Office)

Fax: (814) 865-3248

E-mail: sanjays@psu.edu

Energy and Mineral Engineering

The Pennsylvania State University

206 Hosler Building

University Park, PA16802

EDUCATION:

Stanford University

University of Southern California

Indian School of Mines, Dhanbad

Ph.D. Petroleum Engineering

1999

M.S. Petroleum Engineering

1989

B.Tech

1987

PROFESSIONAL EXPERIENCE:

Professor, John and Willie Leone Family Chair

2015 – Current

Adjunct Professor, UT Austin

2015 – Current

Professor, UT Austin

2014- 2015

Program Leader – Geostatistics and Applied Mathematical Modeling (GAMMA) Team

Focus Area Lead – Center for Subsurface Energy Security, UT Austin

Associate Professor, UT Austin

2008-2014

Program Leader – Geostatistics and Applied Mathematical Modeling (GAMMA) Team

Focus Area Lead – Center for Subsurface Energy Security, UT Austin

Assistant Professor, UT Austin

2002-2008

Program Leader – Geostatistics and Applied Mathematical Modeling (GAMMA) Team

Assistant Professor, University of Calgary

2000-2002

Program Leader – Reservoir Characterization Research Laboratory

Director – Center of Excellence for Reservoir Engineering sponsored by Alberta Ingenuity

Senior Systems Engineer, Bechtel Corporation

1989 – 1996

Designed petroleum product distribution system for Petroleum Authority of Thailand

Engineering design and construction of offshore petroleum facilities in the Bohai bay, China

Engineering, procurement and construction management of Bongkot-Erawan-Khanom offshore gas pipeline, Thailand.

HONORS AND AWARDS:

- John and Willie Leone Family Chair in Energy and Mineral Engineering, 2015-current
- SPE Faculty Pipeline Award, September 2012.
- Cox Visiting Faculty Fellowship – Stanford University, 2010.
- SPE Southwest Region Reservoir Description and Dynamics Award, April, 2009.
- Frank Jessen fellowship awarded by the College of Engineering, University of Texas at Austin, September 2007 – current
- SPE Award for outstanding technical editor, Society of Petroleum Engineering Reservoir Evaluation journal, 2006.

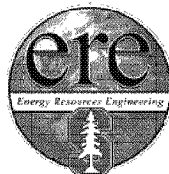
- UT Austin Department of Petroleum and Geosystems Engineering Teaching Excellence award for 2005-2006.
- Oryx Energy Company Centennial Fellowship No. 1 in Petroleum Engineering awarded by the College of Engineering, University of Texas at Austin in September 2005.
- Henry Ramey fellowship for outstanding academic achievement and contributions to the school of Earth Sciences at Stanford University, 1999.
- Frank Miller fellowship for Best Graduate Student in the Petroleum Engineering Department at Stanford University, 1999.
- Centennial Teaching Assistant award (Stanford University), 1999.

PUBLICATIONS:

Referred Archival Journal Publications

1. Min, B., Nwachukwu, A. and Srinivasan, S., "Model selection for CO₂ sequestration using surface deformation and injection data" - **International Journal of Greenhouse Gas Control**, Volume 56, pages 67-92, January 2017.
2. Jeong, H. and Srinivasan, S., 2017, Fast Selection of Geologic Models Honoring CO₂ Plume Monitoring Data Using Hausdorff Distance and Scaled Connectivity Analysis, **International Journal of Greenhouse Gas Control** Volume 59, April 2017, Pages 40–57.
3. Al Hinai, O., Srinivasan, S., Dong, R., Wheeler, M.F. "A new equi-dimensional fracture model using polyhedral cells for microseismic data sets", Accepted in **Journal of Petroleum Science and Engineering**
4. Lee, S., Wheeler, M.F., Wick, T. and Srinivasan, S., "Initialization of phase-field fracture propagation in porous media using probability maps of fracture networks," *Mechanics Research Communications*, Vol. 80, Pages 16-23, March 2017.
5. Leung, J.Y. and Srinivasan, S., "Effects of reservoir heterogeneity on scaling of effective mass transfer coefficient for solute transport," *Journal of Contaminant Hydrology*, Volume 192, September 2016, Pages 181-193.
6. Jeong, H. and Srinivasan, S., "Fast Assessment of Flow Characteristics of CO₂ plumes Plume Characteristics in Heterogeneous Reservoirs Using a Connectivity Based Proxy," *International Journal of Greenhouse Gas Control*, Volume 49, June 2016, Pages 387-412.
7. Li, Liangping, Srinivasan, S., Zhou, H., and Hernandez, Jaime, "Two-point or multiple-point statistics? A comparison between the ensemble Kalman filtering and the ensemble pattern matching inverse methods," *Advances in Water Resources*, Volume 86, Part B, December 2015, Pages 297–310.
8. Ramachandran, H., Pope, G.A. and Srinivasan, S., "Effect of Thermodynamic Phase Changes on CO₂ leakage," *Energy Procedia*, Volume 63, 2014, Pages 3735-3745, November, 2014.
9. Azom, Nnamdi and Srinivasan, S., "Coupled multiphase flow and heat transfer at the steam chamber interface during the Steam Assisted Gravity Drainage Process," *Society of Petroleum Engineering Journal*, October 2013.
10. Leung, J.Y. and Srinivasan, S., "Scale-Up of Mass Transfer and Recovery Performance in Heterogeneous Reservoirs," *Journal of Petroleum Science and Engineering*, Volumes 86–87, Pages 71–86, May 2012.

BC



STANFORD UNIVERSITY

Hamdi Tchelepi
Professor, Energy Resources Engineering
Co-Director, Center for Computational
Earth & Environmental Science
(650) 723-9476; Fax: (650) 725-2099
Email: tchelepi@stanford.edu

Department of Energy Resources Engineering
Green Earth Sciences Bldg., Rm. 065
Stanford, CA 94305-2220
<http://pangea.stanford.edu/ERE/>

August 16, 2017

Prof. Jon Olson
Chair, Department of Petroleum &
Geosystems Engineering,
University of Texas, Austin

Re: Prof. Ryosuke Okuno Tenure and Promotion to Associated Professor in the Petroleum and Geosystems Engineering (PGE) Department

Dear Professor Olson:

I write to you in response to your request letter dated June 29, 2017 for an assessment of Prof. Okuno's scholarly contributions as you consider his case for Tenure and Promotion to the rank of Associate Professor.

I first met Ryosuke Okuno at a scientific conference where he gave a talk about his PhD work with Profs. Russ Jones and Kamy Sepehrmoori. He presented a reduced-variables approach for solving the phase equilibrium problem associated with compositional displacements processes. In that work, Mr. Okuno tackled problems that involve hydrocarbon-solvent mixtures that can form three fluid phases at reservoir conditions. The interesting aspects of the work were that he coupled the phase behavior calculations with the nonlinear transport equations. Dealing with compositional simulation in the presence of three-phase flow in a methodical manner and implementing the solution algorithms in a simulator made for an impressive PhD body of work. That conference where I first met Ryosuke was nearly eight years ago. Since then, I have been keen to follow his research activities.

At the University of Alberta, Prof. Okuno focused on thermal recovery processes of very heavy oil (bitumen). In particular, he investigated the complex thermodynamic behaviors associated with the co-injection of steam and solvent to enhance the recovery of bitumen. The phase behavior of the in-situ hydrocarbon-water fluids and the injected solvent-steam mixture is quite complex. Prof. Okuno led an extensive experimental program to characterize the phase behavior of mixtures of hydrocarbons, solvents, and wa-

ter across a very wide parameter space of pressure, temperature and composition. He then used the experimental results to develop advanced methods to characterize the solvent-hydrocarbon fluids and describe their phase behavior using a modified equation-of-state (EOS). These advanced EOS-based characterizations made it possible to investigate the interactions between the phase behavior and the flow dynamics in the subsurface. In my opinion, the experimental and fluid characterization programs of solvent-hydrocarbon-water mixtures stand out without peer. That work has contributed substantially to our collective confidence in the simulation predictions of heavy-oil recovery processes.

More recently, Prof. Okuno has published papers on the development of a multiphase isobaric isenthalpic framework for mixtures made up of large numbers of components. The framework integrates phase-stability and flash calculations. These developments present a significant step forward in our ability to model thermal-compositional enhanced-oil-recovery processes of very heavy oils, such as bitumen. These developments deal head on with the so-called "narrow-boiling-point" problem, and the proposed isenthalpic stability and flash algorithms are the most promising advance in this area in more than a decade. In his statement, Prof. Okuno indicated interest in investigating the complex phase behaviors of tight media, such as gas/oil-shale. My sense is that he should be encouraged strongly to jump-in without hesitation. The field would benefit from his expertise and perspective.

Ryosuke Okuno's scholarship contributions in the areas of phase behavior and thermal-compositional reservoir simulation are impressive. In my view, Prof. Okuno is the leading expert on modeling phase behavior and its coupling to the flow dynamics. My interactions with Ryosuke have always been in scientific conferences and technical meetings. He presents his ideas clearly and convincingly. Ryosuke has always struck me as highly intelligent, rigorous, and thoughtful.

Prof. Okuno is a world-class expert on the phase behavior associated with subsurface recovery processes. I am convinced that this area is full of great scientific and engineering challenges, and that having him in the department would yield great benefits. I would be happy to "compete" with your great department in order to attract Prof. Okuno to Stanford.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Hamid Tavakoli". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Tuesday, September 5, 2017 at 9:47:10 AM Central Daylight Time

Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

Date: Monday, August 21, 2017 at 3:32:52 PM Central Daylight Time

From: Hamdi Tchelepi

To: Stickney, Stephanie

CC: Olson, Jon

Hi Stephanie,

My CV is attached.

Cheers,

Hamdi

On 8/21/2017 9:52 AM, Stickney, Stephanie wrote:

Hi Hamdi,

Thanks very much for sending in your letter of reference. We also need the C.V.s of all letter writers.
Can you please send me your C.V.?

Thanks,

STEPHANIE STICKNEY, Executive Assistant
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-1210 |
www.pge.utexas.edu

From: <Olson>, Jon Olson
Date: Friday, August 18, 2017 at 2:44 PM
To: Stickney
Subject: FW: Promotion Letter Request, Ryosuke Okuno, University of Texas

FYI.

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 |
www.pge.utexas.edu

From: Hamdi Tchelepi [<mailto:tchelepi@stanford.edu>]
Sent: Friday, August 18, 2017 2:20 PM
To: Olson, Jon <jolson@austin.utexas.edu>
Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

Hi Jon,

The "Evaluation Letter" of Prof. Okuno's Scholarship Contributions is attached.

Let me know if you have any questions regarding this letter.

Have a Nice Weekend.

Best Regards,

Hamdi

On 8/16/2017 12:38 PM, Olson, Jon wrote:

Thanks Hamdi.

Jon E. Olson, Chairman and Professor
Petroleum & Geosystems Engineering
The University of Texas at Austin
Sent from my iPhone

On Aug 16, 2017, at 1:34 PM, Hamdi Tchelepi <tchelepi@stanford.edu> wrote:

Hi Jon,

You'll have it by Friday.

Best Regards,
Hamdi

Prof. Hamdi Tchelepi
Co-Director, Center for Computational Earth & Environmental Science
(CEES),
Energy Resources Engineering Department,
Stanford University,
Stanford, California

On Aug 16, 2017, at 11:12 AM, Olson, Jon
<jolson@austin.utexas.edu> wrote:

Hi Hamdi – I am writing to see if you think you can get to
the promotion letter for Ryosuke Okuno this week. We
really appreciate your help in this important matter. If

you need any information resent, please let me know.
Thanks.

-Jon

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems
Engineering | 512-471-7375 | www.pge.utexas.edu

From: Hamdi Tchelepi [<mailto:tchelepi@stanford.edu>]
Sent: Friday, June 30, 2017 3:21 AM
To: Olson, Jon <jolson@austin.utexas.edu>
Cc: Stickney, Stephanie <stickney@austin.utexas.edu>
Subject: Re: Promotion Letter Request, Ryosuke Okuno,
University of Texas

Hi Jon,

Good to hear from you. I hope all is well. Greetings from
France, where I am on sabbatical till July 16.

I am happy to do this, but I would need until August 10.
Let me know if that would work, or not.

Best Regards,
Hamdi

Prof. Hamdi Tchelepi
Co-Director, Center for Computational Earth &
Environmental Science (CEES),
Energy Resources Engineering Department,
Stanford University,
Stanford, California

On Jun 29, 2017, at 9:00 PM, Olson, Jon
<jolson@austin.utexas.edu> wrote:

Dear Hamdi - I have attached a letter

requesting you to evaluate the promotion dossier of one of our assistant professors, Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help— I know you have been generous with your time for us quite often in recent times. ☺

Please respond to this email as soon as is convenient as to whether you can do this evaluation. Assuming you are willing to participate, the deadline we are requesting for receiving your letter is July 17.

Thanks so much for your time and consideration.

-Jon

Link to significant papers:
https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGskMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen
Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum
and Geosystems Engineering | 512-471-7375 |
www.pge.utexas.edu

<Okuno C.V. PGE.pdf>

<Overall research accomplishment and
direction_Ryosuke
Okuno_2017_06_21.pdf>

<Tchelepi-Okuno-request.pdf>

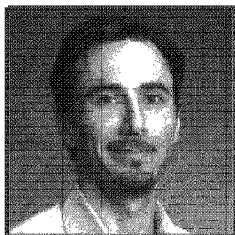
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Prof. Hamdi Tchelepi
Co-Director, Center for Computational Earth & Environmental Science (CEES),
Energy Resources Engineering Department,
Stanford University,
Stanford, California

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Prof. Hamdi Tchelepi
Co-Director, Center for Computational Earth & Environmental Science (CEES),
Energy Resources Engineering Department,
Stanford University,
Stanford, California

Stanford



Hamdi Tchelepi

Professor of Energy Resources Engineering

📄 Curriculum Vitae available Online

Bio

ACADEMIC APPOINTMENTS

- Professor, Energy Resources Engineering
- Affiliate, Precourt Institute for Energy

ADMINISTRATIVE APPOINTMENTS

- Research Positions, including Staff Research Scientist, Chevron Energy Technology Company, (1994-2003)
- Associate Professor, Energy Resources Engineering, Stanford University, (2003-2013)
- Professor, Energy Resources Engineering, Stanford University, (2013- present)
- Co-Director, CEES (Center for Computational Earth & Environmental Sciences), Stanford University, (2010- present)

HONORS AND AWARDS

- Edmund W. Littlefield Fellow, Edmund W. Littlefield Fellowship (1993-1994)
- Nominee for the Council of Graduate Schools Distinguished Dissertation Award, Stanford University (1994)
- President's Individual Achievement Award, Successful Completion of Phase 1 of the Intersect Project, ChevronTexaco & Schlumberger (2003)

PROFESSIONAL EDUCATION

- Ph.D., Stanford University , Petroleum Engineering (1994)
- M.S., King Fahd University , Petroleum Engineering (1988)
- B.S., University of Petroleum and Minerals , Petroleum Engineering (1985)

PATENTS

- Moncorge, A. and Tchelepi, H.A. "United States Patent 8,412,502 B2 System and Method for Performing Oilfield Simulation Operations", Schlumberger-Total, Apr 2, 2013
 - Lee, S.H., Zhou, H., and Tchelepi, H.A.. "United States Patent 8,346,523 B2 Indirect-Error-Based Dynamic Upscaling of Multi-Phase Flow in Porous Media", Chevron-Schlumberger, Jan 1, 2013
 - Lee, S. H., Zhou, H., and Tchelepi, H. A.. "United States Patent 8,204,726 Multi-Scale Method for Multi-Phase Flow in Porous Media", Schlumberger-Chevron, Jun 19, 2012
 - Moncorge, A. and Tchelepi, H.A.. "United States Patent 7,877,246 B2 System and Method for Performing Oilfield Simulation Operations", Schlumberger-Total, Jan 25, 2011
 - J. R. Wallis, Hamdi Tchelepi, "United States Patent 7,684,967 Apparatus, Method and System for Improved Reservoir Simulation Using an Algebraic Cascading Class Linear Solver", Mar 23, 2010
 - J. R. Wallis, H. A. Tchelepi, and H. Cao. "United States Patent 7,516,056 B2 Apparatus, Method and System for Improved Reservoir Simulation using a Multiplicative Overlapping Schwarz Preconditioning for Adaptive Implicit Linear Systems", Schlumberger Technology Corporation, Apr 7, 2009
 - P. Jenny, Hamdi Tchelepi, S.H. Lee. "United States Patent 7,505,882 B2 Stable Method and Apparatus for Solving S-Shaped Non-Linear Functions Utilizing Modified Newton-Raphson Algorithms", Mar 1, 2009
 - Jenny, P., Lee, S.H., and Tchelepi, H.A.. "United States Patent 6,823,297 B2 Multi-Scale Finite-Volume Method for use in Subsurface Flow Simulation", Chevron-Schlumberger, Nov 23, 2004
 - P. Jenny, S.H. Lee, Hamdi Tchelepi. "United States Patent 2004/0176937A1 Multiscale Finite Volume Method for Use in Subsurface Flow Simulation", Sep 5, 2004
-

Hamdi Tchelepi
http://cap.stanford.edu/profiles/Hamdi_Tchelepi/

LINKS

- SUPRI-B: Reservoir Simulation: <https://supri-b.stanford.edu>

From: Jalal Abedi
Date: Friday, June 30, 2017 at 9:44 AM
To: Jon Olson
Cc: Stickney
Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Dr. Olson,

Thank you for your e-mail. Unfortunately, I am not able to evaluate the promotion dossier of Dr. Ryosuke Okuno at this time and I am sorry for the inconvenience.

Best regards,

Jalal

From: Olson, Jon <jolson@austin.utexas.edu>
Sent: Thursday, June 29, 2017 1:02 PM
To: Jalal Abedi
Cc: Olson, Jon; Stickney, Stephanie
Subject: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Jalal - I have attached a letter requesting you to evaluate the promotion dossier of one of our assistant professors, Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Please respond to this email as soon as is convenient as to whether you can do this evaluation. Assuming you are willing to participate, the deadline we are requesting for receiving your letter is July 17.

Thanks so much for your time and consideration.

-Jon

Link to significant papers:
https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGSkMVJ2CPN2tkhT_Ea?dl=0

Okuno_papers

www.dropbox.com

Shared with Dropbox

Hook 'em!
Jon E. Olson, Chair and Frank W. Jessen Professor

Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375
| www.pge.utexas.edu

Olson, Jon

From: Dattagupta, Akhil <datta-gupta@tamu.edu>
Sent: Thursday, June 29, 2017 2:13 PM
To: Olson, Jon
Cc: Stickney, Stephanie
Subject: Re: Promotion Letter Request, Ryosuke Okuno, University of Texas

John

Given my travel schedule, I won't be able to do this on time. Sorry.

Akhil

Sent from my iPhone

On Jun 29, 2017, at 2:06 PM, Olson, Jon <jolson@austin.utexas.edu> wrote:

Dear Akhil - I have attached a letter requesting you to evaluate the promotion dossier of one of our assistant professors, Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Please respond to this email as soon as is convenient as to whether you can do this evaluation. Assuming you are willing to participate, the deadline we are requesting for receiving your letter is July 17.

Thanks so much for your time and consideration.

-Jon

Link to significant papers:

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGskMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
The University of Texas at Austin | Petroleum and Geosystems Engineering | 512-471-7375 | www.pge.utexas.edu

<Okuno C.V. PGE.pdf>

<Overall research accomplishment and direction_Ryosuke Okuno_2017_06_21.pdf>

<Datta-Gupta-Okuno-request.pdf>

Hi Erling – Thanks for your time and consideration. I am sorry it didn't work out but maybe next time! Have a good summer. -Jon

Jon E. Olson
Chair and Professor, Petroleum and Geosystems Engineering
512-471-7375

From: Erling Halfdan Stenby [<mailto:ehst@kemi.dtu.dk>]
Sent: Wednesday, July 05, 2017 5:47 AM
To: Olson, Jon
Subject: RE: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Jon,

I am sorry but I will not be able to help you. I tried to squeeze it in before my vacation but there are too many things to complete.

Best regards,
Erling

Professor Erling H. Stenby, Head of Department
Department of Chemistry
Building 206, Room 240
Technical University of Denmark – DTU
DK – 2800 Kgs. Lyngby

Email: ehst@kemi.dtu.dk
Phone: +45 4525 2012 / +45 2261 6875

From: Olson, Jon [<mailto:jolson@austin.utexas.edu>]
Sent: 29. juni 2017 20:51
To: Erling Halfdan Stenby <ehst@kemi.dtu.dk>
Cc: Olson, Jon <jolson@austin.utexas.edu>; Stickney, Stephanie <stickney@austin.utexas.edu>
Subject: Promotion Letter Request, Ryosuke Okuno, University of Texas

Dear Erling - I have attached a letter requesting you to evaluate the promotion dossier of one of our assistant professors, Ryosuke Okuno. I have also attached his CV, a brief research statement by Dr. Okuno, and a link to copies of 5 significant papers.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Please respond to this email as soon as is convenient as to whether you can do this evaluation. Assuming you are willing to participate, the deadline we are requesting for receiving your letter is July 17.

Thanks so much for your time and consideration.

-Jon

Link to significant papers:

https://www.dropbox.com/sh/6lkxp13urlbsmqn/AADL3svGskMVJ2CPN2tkhT_Ea?dl=0

Hook 'em!

Jon E. Olson, Chair and Frank W. Jessen Professor

Lois K. and Richard D. Folger Leadership Chair

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